

# Knowledge, Attitudes and Practices of Egyptian Farmers Towards Water Resources

*National Survey 2001*

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The Ministry of Irrigation and Water Resources strives to meet the challenge of increasing demand for water. Information on the knowledge, attitude and practices of Egyptian Farmers toward water management is of great importance to the Ministry. Specifically this data is critical to the Water Communication Unit as it designs and implements appropriate communication interventions to increase awareness and encourage changes in water conservation and pollution prevention practices. A baseline survey was conducted in 1998 to collect information on the level of farmer's knowledge, attitudes and practices toward water management. The current survey is an impact assessment to monitor the national trends in the way farmers manage water, to listen to what farmers have to say and to measure the effectiveness of the Ministry's efforts to accomplish its long term objectives.

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## List of Acronyms and Abbreviations

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### AGENCIES

APRP	Agricultural Policy Reform Project
EPIQ	Environmental Policy and Institutional Strengthening IQC
IAS	Irrigation Advisory Service
IIP	Irrigation Improvement Project
IMT	Irrigation Management Transfer
MWRI	Ministry of Water Resources and Irrigation
USAID	US Agency for International Development
WCU	Water Communication Unit
WUA	Water User Associations

### IRRIGATION TERMS

<i>Bahar</i>	A technical worker in the irrigation district.
<i>Handasa</i>	Irrigation district. Comprises approximately 35,000 – 50,000 farmers. The word <i>handasa</i> is also used to refer to the office in which the district irrigation engineer sits.
<i>Mesqa</i>	The lowest level of canal to which the MWRI provides water.
<i>Sakia</i>	Water wheel turned by cow or other livestock.
<i>Canal system:</i>	<ul style="list-style-type: none"> <li>Principle canals begin at Nile barrages</li> <li>Main canals begin at principle canals</li> <li>Branch canals begin at main canals</li> <li>Distributary's canals begin at branch canals</li> <li><i>Mesqa</i> may begin at either branch or distributary's canal</li> </ul>

### RESEARCH TERMS

KAP	Knowledge, Attitudes, and Practice
PRA	Participatory Rural Appraisal



## Executive Summary

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Egypt has a fixed amount of water available per year: 55.5 billion meters<sup>3</sup> per year. This was an annual average of 1,893 meters<sup>3</sup> per person per year when the treaty was written in 1959. By 1998, the amount had fallen to 877 meters<sup>3</sup> per person; and in 2001, the increase in population had pushed this down to 798 meters<sup>3</sup> per person. The Ministry of Water Resources and Irrigation (MWRI) has been working to improve Egypt's ability to sustainably manage and use water from the Nile by improving policy assessment and planning capabilities, strengthening irrigation system management, and involving the private sector, with technical assistance from the EPIQ Water Policy Reform Program.

In recent years, the MWRI has undertaken a number of activities geared to these objectives. These activities were accompanied by a national baseline survey of the knowledge, attitudes and practices (KAP) of Egyptian farmers in 1998. The purpose of the current study is to monitor national trends in the way farmers manage water, to listen to what farmers have to say, and to compare present data with the 1998 survey in an attempt to measure the effectiveness of the Ministry's efforts to accomplish the long-term objectives listed above. It is expected that the findings from this current report will help the MWRI to modify its activities to better accomplish its communication goals, by identifying activities that have been successful, and suggesting ways to improve other activities.

The overall purpose of the 2001 farmers' study on knowledge, attitudes, and practices (KAP) towards water resources was served by both quantitative and qualitative research: a KAP survey and a participatory rural appraisal (PRA). While the purpose of the survey was to provide national level estimates of a large number of variables, the purpose of the PRA study was to provide rich, in-depth information over a smaller range of topics.

The 2001 survey was designed based on the 1998 survey, starting with a similar sample and questionnaire design, and adding modifications to address the 2001 needs of the Ministry. The survey is based on the level of the *mesqa* – the tertiary water channel: the sample locations were 317 *mesqas* selected on a probability basis throughout Egypt, and on those *mesqas*, a total of 2,267 men and 279 women farmers were interviewed. In addition, 509 farmers' wives were interviewed using a questionnaire.

The key findings of the survey are summarized in the following sections, followed by a summary table of monitoring indicators of communication, knowledge, attitudes and practices.

### COMMUNICATION

The Ministry has worked to effect changes in irrigation practices through a wide variety of efforts among different sectors. Among these efforts have been those of the Water Communication Unit (WCU) including TV spots, TV programs, and print materials. The spots were aired from November 1999 – March 2000. In this survey, forty-four percent of men farmers and 22 percent of women farmers reported that they had ever seen any of the spots. Exposure to TV spots is highest in East Delta, at 55 percent, close to the national average in West Delta, Middle Delta, and Middle Egypt, and in Upper Egypt. Just over a quarter of men (27 percent) reported that they had seen any TV program, with only 5 percent of women farmers reporting this. Exposure to the TV program about laser land leveling was the highest of the five programs, at 21 percent of men, while exposure to the program about WUAs was the lowest, at 5 percent.

About one in ten farmers (13 percent) typically visit their irrigation engineer at least once per year – and most of those visits occur in the summer, the busy season. This percentage is highest in Middle Delta (20 percent) and East Delta (25 percent). The proportion of farmers in groundwater areas who visit their engineer is almost double the proportion in the Nile valley, at 23 percent. Women farmers almost never visit their irrigation engineer. Most visit the irrigation engineer to

request more water. A quarter of all men farmers reported that they had seen their irrigation engineer on the branch canal or drain in the summer of 2001. Farmers in East Delta, at 47 percent are the most likely to have seen the engineer in the field.

The data show that nine in ten farmers would like the irrigation engineer to consult with them on matters such as branch canal operation, scheduling cleaning, the rotation, garbage in canals and illegal outtakes.

When farmers are dissatisfied with the irrigation engineer, they often seek alternative routes. Eleven percent of farmers had lodged a complaint through political channels in the twelve months preceding the survey, 9 percent had lodged a complaint with the irrigation directorate, and 4 percent had lodged a complaint with the central Ministry office in Cairo. Most farmers were dissatisfied with the result of the complaint process, no matter where they lodged the complaint. Fifty-nine percent of farmers would like to discuss how to get more water, if they had a chance to speak to a senior Ministry official. Twenty-seven percent would like to discuss canal cleaning, 22 percent would like to discuss drainage issues, and 18 percent would like to discuss more consistent rotations with a Ministry official if they had the chance.

Forty-eight percent of farmers seek advice about crop selection from others.

More than half of men farmers (58 percent) and 55 percent of women farmers said that their greatest concern about irrigation in the future was the availability of water. A second concern was that the water supply be sufficient and clean, which was expressed by 43 percent of men farmers and 42 percent of women farmers.

Compared to 1998, the data show a significant increase in the proportion of men farmers who know the name of their irrigation engineer, the proportion of farmers who met with their engineer last year, and the proportion of farmers who seek advice in crop selection. Farmers are more worried about water pollution, the high cost of irrigation, and the salinity of irrigation water.

#### **FARMERS' KNOWLEDGE OF WATER AND IRRIGATION**

Virtually all men farmers (98 percent) knew that the main source of water is the Nile, while only 85 percent of women farmers knew this fact. Virtually all men farmers (98 percent) and around 91 percent of women farmers knew that agriculture consumes the most water in Egypt. Men farmers are much more knowledgeable about the possibility of a water scarcity in the future than women farmers and wives: 43 percent of men farmers expect a problem in the future compared to around a fifth of women farmers and 13 percent of wives. More than one third of respondents said that they are definitely not expecting a problem in the future. In fact, the bulk of women respondents and around a fifth of men respondents simply did not know whether there was likely to be a problem in the future or not.

Half of men farmers (51 percent) knew that the amount of water available was fixed, while 16 percent did not know whether it was fixed or variable. Sixty-one percent of men respondents said they thought Egypt could negotiate a larger quota of water, while most women farmers did not know.

The findings indicate that farmers' awareness of Water User Associations (WUA) continues to be low (6 percent of men farmers, and one percent of women farmers). Sixty-four percent of men farmers and 31 percent of women farmers had ideas about how to irrigate with less water. Irrigating by night was suggested by substantial percentages of farmers (41 percent), followed by leveling the land and irrigating one part at a time (36 percent and 34 percent respectively). Farmers in West Delta are more likely to have ideas about how to use less water than farmers in other areas.

Almost a third of men and women farmers (40 and 33 percent respectively) knew that the advantage of irrigating at night is that less water is required. The findings also indicate that

farmers know of more effective methods of land leveling: every farmer who said he would prefer to use another method named a more effective method as his preferred method. For example, every farmer who leveled by a mechanical cultivator and preferred another leveling method said he would prefer leveling by laser.

Overall, more than 90 percent of men and women farmers knew that rice requires more water than other crops. Ninety-three percent of men and 82 percent of women rice farmers had ever heard of a short duration variety of rice.

Compared to the 1998, the 2001 data show significant increases on ten of fourteen knowledge indicators for both men and women farmers, including knowledge of the Ministry's irrigation projects, and the rice policy. Knowledge of WUAs is rising at a rate commensurate with the expansion of WUA program implementation.

#### ATTITUDES TOWARD WATER RESOURCES

The findings show that the majority of farmers said they felt the Ministry has an easy job (42 percent of men farmers and 62 percent of women farmers), while about 17 percent of men farmers and 14 percent of women farmers said it was very hard.

Overall, 85 percent of men farmers are willing to share in the costs of upgrading to provide continuous flow, and 83 percent of men farmers are willing to share in the costs of upgrading the drainage system. There is a higher level of willingness among men farmers than women farmers to share in the costs of improving both the irrigation and drainage systems. Eight in ten or more of farmers in every region except Upper Egypt were willing to share in these costs.

There was a high degree of interest among farmers in participating in specific tasks within the WUA, ranging from 97 percent of potential men members being willing to participate in solving conflicts between farmers to 74 percent of these respondents being willing to share in setting up association regulations. There was also a high level of willingness to share in the costs of *mesqa* repair and maintenance (91 percent).

Men farmers in both irrigated and groundwater areas are aware that there would be both advantages and disadvantages to having an increased role in water management. For *mesqa* management, they see benefits outweighing disadvantages. Farmers in East Delta appear to be the most amenable to an increased role in *mesqa* maintenance. The benefits all farmers anticipate from an increased role in *mesqa* management are: cleaning the *mesqa*, organizing water delivery better, and resolving complaints. These benefits outweigh the disadvantage of the effort it would take.

Women are less likely to see benefits to an increased role in water management and more likely to see disadvantages at both the *mesqa* and canal level. Seven in ten women saw a disadvantage, while only five in ten saw a benefit.

For canal management, the results are more equivocal than for *mesqa* management. Benefits outweigh disadvantages in all regions except Middle Delta and Upper Egypt, but by smaller margins than for *mesqa* management.

Compared to 1998, farmers are significantly more willing to share in the costs of upgrading the irrigation and drainage systems. There was no change in farmers' willingness to join a WUA.

#### IRRIGATION PRACTICES

The average number of summer irrigations is 22 irrigations per farmer in the Nile valley. In groundwater areas and among women farmers, seven of twenty summer irrigations are carried out at night, while in the Nile valley, 10 of 22 summer irrigations are performed at night. Virtually all farmers in the Nile valley level their land, while some 21 percent of farmers in groundwater areas do not do so. Very few farmers in the Nile valley level their land by hand: most (78 percent of

men and 83 percent of women) use a mechanical cultivator, while some use a manual cultivator pulled by an animal (19 percent of women and 18 percent of men). One in ten men farmers in the Nile valley levels his land by laser, while the majority of farmers in groundwater areas do so (72 percent).

When farmers experience water shortages at critical times, they may use water from drains to irrigate, feeling that it is better to use this water than no water at all. All groundwater farmers and about half of all farmers in the Nile valley have fields located on Open drains. Just under half of all farmers in the Nile valley irrigate from drains, with considerable variation by region: 38 percent of farmers in Middle Egypt located on open drains compared to 53 percent of farmers in West and East Delta. This practice is also significantly more prevalent among farmers whose *mesqa* lies at the tail of a canal than at the head of a canal.

In groundwater areas, the leading determinants of crop selection are market price (71 percent), cost of agricultural inputs (54 percent), and availability of agricultural inputs (24 percent), while household consumption was mentioned by only 13 percent of farmers. Among men in the Nile valley, the leading determinants are household usage (46 percent) and feeding livestock (39 percent). Economic factors such as market price (38 percent), quantity of water needed (30 percent), and cost of agricultural inputs (11 percent) form a second tier of determinants, followed by cropping pattern considerations such as neighbor's cultivation (29 percent), crop rotation (27 percent) and suit the soil (12 percent). Women farmers mainly farm for household consumption.

The survey results show that virtually all farmers in the Nile valley (93 percent of men and 82 percent of women) who have ever grown rice have heard of a variety of short-duration rice – a variety of rice that matures in less than the 160 days required by long duration varieties. These varieties of rice are virtually unknown among farmers in groundwater areas. Seventy-seven percent of farmers know the correct name of a variety of short-duration rice. Almost all rice farmers in West Delta knew a correct name (93 percent), while 62 percent of Middle Delta farmers knew a correct name. Around three-quarters of men and women farmers in the Delta had ever grown a short-duration variety, and 65 percent of men and 54 percent of women had sown such a variety in the summer of 2001.

Compared to 1998, the mean number of summer and winter irrigations has increased significantly. The mean number of summer irrigations has risen from 15 to 22, and the mean number of winter irrigations has increased from 7 to 10. The proportion of farmers leveling their land by laser has also risen, from 4 percent in 1998 to 10 percent in 2001. The importance of market price and the cost of agricultural inputs have increased significantly as factors in crop selection. The proportion of irrigations undertaken at night has remained the same, as has the main determinant of crop selection, while the proportion of men farmers irrigating from drains has dropped.

## IRRIGATION PROBLEMS

Two-thirds of farmers reported that their main problem in the summer was a lack of water, while around a quarter of farmers said they had no problems with irrigation. A further 25 percent of farmers reported that their water does not come on schedule, and around ten percent of men and women farmers described the high cost of irrigation as a problem. By region, farmers in Upper Egypt reported water shortages in the summer was lower, while farmers in Middle Egypt reported most from shortages. Problems with irregular rotation are most common in the Middle Delta.

Twenty-six percent of men and 31 percent of women farmers reported that the water in their *mesqa* rarely or never flows on predictable rotation. There are significant differences by region: 75 percent of farmers in Upper Egypt indicated that water always or usually flows in the *mesqa* on schedule, while only 36 percent of farmers in Middle Delta reported that water arrives in the *mesqa* on rotation.

Thirteen percent of men farmers and nine percent of women farmers said their canals were often or usually blocked by waste. *Mesqas* are more likely to be blocked, as reported by 21 percent of



men and 24 percent of women farmers. Similar percentages of farmers reported blockages of drains.

Fifty-four percent of men farmers and slightly less than half of women farmers reported that the water was polluted. These percentages differed significantly by region, ranging from 81 percent in the Middle Delta and Middle Egypt to 27 percent in West Delta. The most frequently cited causes of pollution were household wastewater (75 percent of men farmers and 82 percent of women farmers), dead animals (51 and 41 percent, respectively), and sewage (31 and 33 percent, respectively).

Around three-quarters of farmers said that cleaning the *mesqa* is the farmers' responsibility (77 percent), and 40 percent that it was the responsibility of the agricultural cooperative. The findings also show that 6 percent of men farmers experienced drainage problems compared with 4 percent for women farmers.

Fifty-six percent of farmers in East Delta reported lost crops due to lack of water compared to 28 percent in both West Delta and Middle Egypt. Overall, 8 percent of farmers reported that they left land fallow due to lack of water. Among farmers in East Delta who left land fallow due to lack of water, the average area left fallow was 1.9 feddans.

Compared to 1998, significantly more farmers reported that they had enough water for irrigation in the summer (29 percent in 2001 compared to 15 percent in 1998) and the winter (81 percent compared to 55 percent), and consequently, the proportion of farmers saying they had no irrigation problems in the summer or winter increased. There was no change in the proportion of farmers saying their canals and *mesqas* were often or always blocked by waste, or in the proportion of farmers who said they received water on the correct rotation in the canal or *mesqa*. The proportion of farmers who reported lost crops due to lack of water dropped significantly, from 54 percent in 1998 to 46 percent in 2001 (part of this difference may be attributed to the abundance of water in 2001).

### **WIVES' ROLE IN IRRIGATION**

Knowledge of national water issues is lower among wives than their husbands. For example, while almost half of husbands know that Egypt's water quota is fixed, almost the same proportion of their wives do not know whether it is fixed or variable. Almost eight in ten husbands have heard of Tushka, but more than half of wives have not heard of any big irrigation project. Around half of wives and a fifth of husbands reported that they do not know whether Egypt would face scarcity of water in the future. More than one-third of wives and slightly fewer husbands felt that Egypt would not face any scarcity of water in the future.

The disparity between husbands' and wives knowledge of on-farm water management is smaller than the disparity in knowledge of national water issues. Couples' greatest concern is that water arrives at their fields at the right time, cited by 56 percent of husbands and 40 percent of wives. Equal proportions of husbands and wives were concerned about water quality – about 40 percent of each. Husbands were more concerned about the cost of irrigation than wives, but even for husbands, it was a minor worry.

The results indicate that similar proportions of farmers and their wives (51 percent) said that the wife helps in agriculture and irrigation. Among those who said that the wife does help, there was nearly exact agreement within couples as to her specific tasks. Slightly less than three-fourths said that wives help in rearing livestock, two-thirds said wives help in cultivation, and around one-tenth said that wives help in irrigation. The estimated mean number of hours a wife helps in agriculture and irrigation as reported by husbands and a wife is also almost exactly the same, at around 18 hours per week.

Although 29 percent of wives do not know whether the water flows in the canal on schedule, the greater percentage of wives said that it always does so, as did the greater percentage of their

husbands. Regarding the flow of water in the *mesqa*, a quarter of wives were unable to say whether it did flow on schedule or not, while as in the previous question, not one husband said he didn't know this important piece of information. In couples' opinion, household wastewater and soap residue constitute the greatest source for water contamination as mentioned by three-fourth of wives and similar percentage of their husbands. Throwing dead animals in canals or *mesqas* was mentioned by around half of farmers and 44 percent of their wives, while the industrial wastes were realized as pollutants by very low percentages of couples.

Wives were well aware of whether their husbands lost crops due to lack of water and whether they left land fallow due to inadequate water. Slightly less than a third of wives reported that their husbands lost crops due to lack of water, confirmed by similar proportion of husbands. Slightly less than one tenth of couples responded that they left land fallow due to lack of water. Moreover, wives were aware of when this occurred: 84 percent said in the summer, and 16 percent said in both summer and winter, almost matching their husbands' responses.

#### **PARTICIPATORY RURAL APPRAISAL (PRA)**

The PRA study yielded qualitative information about water management which complemented the KAP survey findings, and elaborated on gender differentials. This includes findings on the gender division of labor in agriculture, domestic water use, community water management; and problems and needs related to water management. Most of the PRA findings reflected the findings of the KAP survey, and in many cases, provided an additional level of depth and contextual explanation.

#### **POLICY IMPLICATIONS**

A high percentage of farmers indicated a desire to be included in the decision-making process regarding canal operation and maintenance activities. Likewise, a high percentage indicated a willingness to participate in WUAs and to share the cost of upgrading the irrigation and drainage systems in their local area. It appears therefore that conditions are conducive to expanding and accelerating the transfer of O&M at the branch canal level with future consolidation to the District level. MWRI should evaluate the survey responses related to transfer in more detail, consider conducting additional limited surveys designed to assess attitudes toward transfer specifically, and adjust present policies related to transfer based on the results.

MONITORING INDICATORS		1998	2001
<b>COMMUNICATION</b>			
1.	Ever seen a spot on television about conservation of irrigation water	19%	<b>26%</b>
2.	Ever seen a spot on television about pollution of irrigation water	23%	<b>29%</b>
3.	Know the correct name of their irrigation engineer	8%	<b>27%</b>
4.	Talked with irrigation engineer last year	9%	<b>13%</b>
5.	Asked an irrigation engineer for advice in crop selection	0%	1%
6.	Have information needed to choose new crops to try?	36%	33%
7.	Get advice in crop selection	29%	<b>48%</b>
<b>KNOWLEDGE</b>			
8.	Know that the Nile is the main source of water	78%	<b>98%</b>
9.	Know that ten countries share the Nile	2%	<b>3%</b>
10.	Know that Egypt has a fixed water supply	48%	51%
11.	Know that Egypt cannot negotiate an increased quota	8%	<b>15%</b>
12.	Know that Egypt might face a water scarcity	33%	<b>43%</b>
13.	Know about the Tushka agricultural project	54%	<b>78%</b>
14.	Know about EL Salam Canal agricultural project	15%	<b>31%</b>
15.	Ever heard of a Water Users Association	3%	<b>6%</b>
16.	Know that night irrigation takes less water/entails reduced evaporation	57%	54%
17.	Able to cite one key way a farmer can save water	20%	<b>64%</b>
18.	Know that rice is a crop that consumes a lot of water	67%	<b>94%</b>
19.	Know that the Ministry limits rice growing because of its high water requirement	57%	<b>80%</b>
20.	Proportion of rice farmers who have ever heard of a short duration variety of rice	63%	<b>93%</b>
21.	Proportion of rice farmers who can name one variety of short season rice (Giza 4000, Giza 177, Giza 178, Sakha 101 or Sakha 102)	45%	<b>77%</b>
<b>ATTITUDES</b>			
22.	Would join a Water Users Association if one were formed in their area	78%	75%
23.	Willing to share in cost of upgrading irrigation system	76%	<b>85%</b>
24.	Willing to share in costs of upgrading drainage system	73%	<b>83%</b>
<b>PRACTICES</b>			
25.	Consider water requirements in crop selection	34%	<b>30%</b>
26.	Level land by laser	4%	<b>10%</b>
27.	Proportion of farmers on uncovered drains who irrigate from drains	51%	<b>45%</b>
28.	Mean number of summer irrigations	15	<b>22</b>
29.	Proportion of summer irrigations carried out at night	45%	47%
30.	Proportion of rice farmers who have ever grown a short-duration variety of rice	26%	<b>78%</b>
31.	Proportion of rice farmers who grew a short-duration variety of rice last summer	29%	<b>65%</b>
<b>PROBLEMS</b>			
32.	Water in <i>mesqa</i> enough for irrigation in summer	15%	<b>29%</b>
33.	Water in <i>mesqa</i> enough for irrigation in winter	55%	<b>81%</b>
34.	Water usually or always flows in canal on rotation	77%	80%
35.	Water usually or always flows in <i>mesqa</i> on rotation	53%	50%
36.	Canals are usually or often blocked by waste	12%	13%
37.	<i>Mesqas</i> are usually or often blocked by waste	19%	21%
38.	Lost crops due to lack of water	57%	<b>32%</b>
39.	Left land fallow due to lack of water	8%	8%
<b>Number of Farmers (men farmers in the Nile Valley)</b>		<b>1910</b>	<b>1980</b>
Figures in bold indicate that the change from 1998 was statistically significant (at $p < 0.05$ ). Values not in bold indicate that any difference is not statistically significant			

## BACKGROUND

1

Egypt has a fixed amount of water available per year: 55.5 billion meters<sup>3</sup> per year. This was an annual average of 1,893 meters<sup>3</sup> per person per year when the treaty was written in 1959. By the time of the 1998 KAP survey, the amount had fallen to 877 meters<sup>3</sup> per person; and in 2001, the increase in population had pushed this down to 798 meters<sup>3</sup> per person. With technical assistance from the EPIQ Water Policy Reform Program, the Ministry of Water Resources and Irrigation (MWRI) has been working to improve Egypt's ability to sustainably manage and use water from the Nile by improving policy assessment and planning capabilities, strengthening irrigation system management, and involving the private sector.

The long-term purpose of activities with the private sector is to increase farmer participation in water policy formulation and implementation. Work with the private sector has focused on the following areas:

### Communication

- Fostering improved communication between farmers and the MWRI.

### Knowledge

- Increasing farmers' knowledge about the national water situation.
- Improving farmers' knowledge of the most efficient irrigation methods.
- Boosting farmers' knowledge about how to improve water quality.

### Attitudes

- Beginning to shift farmers' attitudes towards a desire to conserve water.
- Preparing farmers to take on some new irrigation management tasks.

### Practices

- Enhancing the level of on-farm water efficiency practiced by farmers.
- Raising the level of farmer participation in decision-making related to irrigation, including membership in Water User Associations.

The MWRI has undertaken a number of activities geared to these objectives. These activities were supported by national survey of the knowledge, attitudes and practices (KAP) of Egyptian farmers in 1998<sup>1</sup>. The purpose of the current report is to monitor national trends in the way farmers manage water, to listen to what farmers have to say, and to compare present data with the 1998 survey in an attempt to measure the effectiveness of the Ministry's efforts to accomplish the long-term objectives listed above. It is expected that the findings from this current report will help the MWRI to modify its activities to better accomplish its communication goals, by identifying activities that have been successful, and suggesting ways to improve less successful activities.

## 1.1 STUDY OBJECTIVES

EPIQ adopted a two-pronged approach to this study: quantitative and qualitative. To meet MWRI's quantitative data needs, the 1998 survey was repeated, using a new sample drawn from an updated sample frame. The questionnaire was designed to include questions repeated from the 1998 questionnaire, and new questions. To meet the Ministry's qualitative data needs, a qualitative researcher undertook Participatory Rural Appraisals in five communities. The findings

<sup>1</sup> Knowledge, Attitudes and Practices of Egyptian Farmers Towards Water Resources: A National Survey, October 1998. Prepared by El-Zanaty and Associates for the GreenCOM Project, under the Agricultural Policy Reform Project, with the Water Communication Unit of the Ministry of Water Resources and Irrigation.  
[http://www.dec.org/partners/dexs\\_public/orderdex.cfm?DocId=PN-ACJ-762](http://www.dec.org/partners/dexs_public/orderdex.cfm?DocId=PN-ACJ-762)

from this study would be used to enrich and validate the findings from the quantitative survey, and to explore new areas of interest to the project.

The objectives of the KAP survey were to:

- Monitor trends in farmers' knowledge, attitudes, and practices towards water resources.
- Provide a means of communication from the farmer to the Ministry, by collecting data on current levels of farmers' attitudes and problems, and reporting them back to the Ministry.
- Measure the effectiveness of communication activities in reaching their target audiences.

The objectives of the PRA study were to:

- Obtain in-depth information from farmers on topics that are covered in a brief format through the survey questionnaire.
- Gain additional knowledge about topics that EPIQ/MWRI is addressing through its policy activities.

Following are the broad research questions that are addressed by this study, reflecting the three objectives:

#### **Monitoring trends**

1. How has farmers' knowledge about the national water situation, efficient irrigation, and water quality changed since 1998?
2. Have farmers' attitudes towards the Ministry changed?
3. Do farmers' seem to be more amenable to taking on an increased role in the management of irrigation water?
4. Are farmers irrigating their crops more efficiently than before?
5. Have farmers taken on new decision-making tasks related to irrigation management?

#### **Communication from farmer to Ministry**

6. What would farmers like to convey to the Ministry?
7. What problems are farmers experiencing?
8. What regional issues should the Ministry be aware of?

#### **Effectiveness of communication activities**

9. How effective were the communication activities at reaching their target population?
10. Was there any difference in the effectiveness of communication activities at reaching men or women farmers?
11. Was there any difference in the effectiveness of communication activities by region?
12. What information does the survey provide the Ministry about how to modify the design of future communication activities?
13. What is the level of communication between the Ministry and farmers?
14. Have communications between the Ministry and farmers improved?

## 1.2 ORGANIZATION OF THE REPORT

The findings of the study are presented here in eleven chapters, as follows:

- The introductory chapters (Chapters 1-3) discuss the survey objectives, methodology, and background characteristics of the respondents.
- The survey results chapters (Chapters 4-9) discuss the results of the survey regarding communication, knowledge, attitudes, practice, problems, and wife's role in irrigation. Each chapter first discusses the 2001 findings, and then concludes with a section highlighting the changes between 1998 and 2001.
- The PRA study is summarized in Chapter 10.
- The conclusion chapter, Chapter 11, reviews how the study met its objectives and responded to the research questions, and draws out recommendations for programs.

Throughout the report, recommendations are highlighted in text boxes, and summarized in the conclusion chapter. The purpose is to show that the recommendations are research-based.

Due to the large sample size, virtually all differences between regions are statistically significant, unless mentioned otherwise. The word "significant" refers to significance at the  $p < 0.01$  level. Where multiple responses are possible, percentages do not sum to 100%. In Tables, these questions are noted in the first column as "MR." Because the areas included as "groundwater areas" differ substantially from the other areas, results for those areas are not included in the total column in the tables. This also permits a more accurate comparison with the 1998 data. Tables by education level include Groundwater farmers. Tables showing change between 1998 and 2001 do not include groundwater farmers, since they were not included in the 1998 sample.

The MWRI is referred to as "the Ministry" to facilitate reading. The five regions (excluding groundwater areas) are referred to as "the Nile valley," for ease of reading.

## SURVEY METHODOLOGY

## 2

The overall purpose of the 2001 farmers study on knowledge, attitudes, and practices (KAP) towards water resources was served by both quantitative and qualitative research: a KAP survey and a participatory rural appraisal (PRA). While the purpose of the survey was to provide national level estimates of a large number of variables, the purpose of the PRA study was to provide rich, in-depth information on a smaller number of topics.

The survey was designed based on the initial 1998 survey, starting with a similar sample and questionnaire design, and adding modifications to both to address the 2001 needs of the Ministry and EPIQ. The survey is *mesqa*-based: the sample locations were 317 *mesqas* selected on a probability basis throughout Egypt, and on those *mesqas*, a total of 2,267 men and 279 women farmers, plus 509 farmers' wives were interviewed using a questionnaire.

The survey was conducted in four stages between August 2001 and January 2002. The first phase involved preparatory activities, including sample design, and selection activities such as farmers' listing. At the same time, the survey questionnaires were developed, pre-tested and finalized. This stage took two months. The second phase involved interviewing farmers and wives, which took three weeks. The third phase involved all of the data processing necessary to produce a clean data file, including editing, coding, entering, and verifying data and checking for consistency. The final phase of the survey involved data analysis and report preparation. Following is a detailed description of each of these activities.

### 2.1 SAMPLE DESIGN AND SELECTION

**Sample size.** The overall target sample was 2,200 farmers. Due to the Ministry's interest in gender differentials, it was determined to interview as many women farmers as possible, as well as twenty percent of men farmers' wives randomly selected to be interviewed in their houses<sup>2</sup>.

**Sample design.** The initial sample has the same design as the 1998 sample. In 2001, however, the Ministry and EPIQ had an additional interest in findings in areas known as new lands and in areas with groundwater. New lands are areas of reclaimed land, and they were excluded in 1998 due to the Ministry's feeling that irrigation practices and problems differed substantially from those in old lands. However, new lands are irrigated from *mesqas* as are old lands. Groundwater areas are located in *frontier* governorates, and a separate department in the Ministry handles their irrigation matters.

**Initial sample.** The 1998 sample was designed and implemented in 1998 by El-Zanaty & Associates using a probabilistic multistage sampling technique. The sample was designed to reflect the divisions through which the Ministry works: five irrigation regions, and within these, directorates, inspectorates, and *handasas*, which are roughly equivalent to districts. A probability sample of farmers was designed and selected in four stages in 1998. A total of 245 *mesqas* were selected from the five regions. The same 245 *mesqas* selected for the 1998 survey were selected for the 2001 survey.

**New lands sample.** This sample is located in the inspectorates of El Salam, El Amirya, El Salhia, and Qibli Beheira. First, one *handasa* was chosen systematically from each of the four inspectorates with probability proportional to the number of farmers in the inspectorate. The number of landholdings was used as a proxy for the number of farmers, taken from the results of the 1990 Agricultural Census. Second, three canals were selected randomly from each chosen *handasa* with probability proportional to the area of lands cultivated by the canal. Third, four *mesqas* were selected from each canal using the same procedure that was used in the Baseline

<sup>2</sup> The Ministry has just established a Gender Unit within the Irrigation Advisory Service.

(two at the beginning of the canal and two at the end of the canal). Thus, a total of  $(4 \times 3 \times 4 =) 48$  *mesqas* in new lands were selected.

**Groundwater areas sample.** Groundwater areas are located in the directorates of the New Valley, the Red Sea, Marsa Matrouh, North Sinai, and South Sinai. First, two directorates were selected purposively, taking into account the cost of fieldwork and the fact that the Ministry's Water Communication Unit had been active in these directorates: the New Valley and Marsa Matrouh were selected. Second, one inspectorate in each directorate was selected, with probability proportional to size of agricultural landholdings: Farafra and Siwa were selected. Third, twelve wells in each inspectorate were selected, with probability proportional to the size of the irrigated area. Thus, a total of  $(2 \times 1 \times 12 =) 24$  wells in groundwater areas were selected.

The total number of *mesqas* and wells selected was  $245 + 48 + 24 = 317$  *mesqas*. The Global Positioning System (GPS) was used to obtain locations of these *mesqas* during listing, and these are mapped in Appendix B.

## 2.2 FARMERS' LISTING

The names of the farmers on all 317 *mesqas* were listed to provide an accurate sample frame. For the purpose of the survey, an eligible farmer was defined as the person responsible for decision-making regarding agricultural land use, crop selection, and water management. The farmer might or might not be the landowner and might be men or women.

This was accomplished through an extensive listing process. Listing staff attended a one-week training course with one day of field practice. A brief manual including the main definitions was prepared for the listing training. The manual used the same definitions and procedures that were used in the 1998 listing operation. After the training, five supervisors and ten listers were organized into five teams. Each team was assigned to a region, and was provided with the names of directorates, inspectorates, districts, and canals; detailed maps of each canal with the selected *mesqas* marked on them. The listing operation began in mid-September and lasted three weeks.

For quality control purposes around ten percent of the selected *mesqas* were selected for re-listing.

A total of 12,165 farmers were listed on 317 *mesqas*: 11,306 men farmers, 283 women farmers, and 524 farmers in groundwater areas. A random, systematic, self-weighted sample of men farmers on each *mesqa* was drawn with probability proportional to size, while all women farmers listed were selected for inclusion.

## 2.3 QUESTIONNAIRE DEVELOPMENT AND PRE-TEST

The survey used two questionnaires, a farmer's questionnaire and a farmer's wife's questionnaire. The interviews were conducted individually in the field with the men and women farmers and at home with wives. The questionnaires were developed by El-Zanaty & Associates using the 1998 survey questionnaires with the technical assistance of the consultant and revision of EPIQ technical staff. The main objective of the questionnaires was to assess men's and women's knowledge, attitudes and behavior concerning water management. The questionnaire sought information in five sections as follows:

1. Background information.
2. Farmer participation:
  - a. Public awareness.
  - b. Public participation in decision-making.
  - c. Irrigation management transfer.
  - d. Integrated water management.
3. Water use efficiency:
  - a. On-farm water management.
  - b. Water quality.



- c. Mismatch of supply with demand.
- d. Drainage water reuse.
- 4. Economic growth.
- 5. Spouse's role.

The farmer's wife's questionnaire was a shorter version of the farmer questionnaire and asked for the wife's background, wife participation (public awareness, and irrigation management transfer), water use efficiency (on-farm water management water quality, and mismatch), woman's role, and economic growth.

El-Zanaty & Associates translated the draft questionnaires into Arabic for the pretest. Following three days of training, three interviewers pre-tested the questionnaires in Dahshour at the end of September 2001 for four days. A total of 60 farmers' questionnaires and 20 wives' questionnaires were completed during the pretest. Based on the pretest results, the questionnaires were reviewed and finalized. English version of the final questionnaires are included in Appendix D.

## 2.4 DATA COLLECTION

Materials were developed for use in training personnel involved in the fieldwork. An interviewer's manual presented general guidelines to follow while conducting an interview, with specific instructions for asking particular questions. Also, a brief supervisor's manual described the duties of the team coordinator and rules for field editing. A set of field and office control forms for tracking the fieldwork was developed and tested in the training program.

Twenty-eight male interviewers completed a special one-week training program in mid October 2001. The training program included:

- Lectures related to specific survey topics (e.g., water problems in Egypt, irrigation systems).
- Interviewers watched the TV spots and TV programs as well as printed materials and posters, and listened to the cassette.
- Specific sessions with visual aids on how to fill out the questionnaires.
- Opportunities for role playing and mock interviews.
- One-day field practice in areas not covered in the survey.
- Exams.

At the end of the training course a total of 23 interviewers were selected.

Fieldwork started on October 20, 2001, and was completed November 5, 2001. The field staff were divided into five teams; each team had one-supervisor and three to four interviewers. The supervisor was responsible for organizing the fieldwork for the team, reviewing and verifying the consistency of the questionnaires in the field. In addition, the supervisor collected information from the district irrigation engineer for each *mesqa*: the names of the *Bahar*, the agricultural extension worker, the director of the village bank, the head of the agricultural cooperative, the supervisor of agricultural extension, the agricultural extension officer, and the official rotation schedule for each *mesqa*. This allowed farmers' responses to be coded in the office as correct or incorrect.

As soon as the main data collection was completed for a team, a random sample of up to 10 percent of the farmers was selected for re-interview as a quality control measure. A shorter version of the questionnaire was used for the re-interviews. In addition, during the re-interview stage, callbacks were conducted with individuals who were not available at the time of the original visit. During this stage, interviewers were not allowed to work in the same area in which they participated in the initial fieldwork. Callbacks and re-interviews began November 8 and were completed November 13, 2001.

## 2.5 DATA PROCESSING ACTIVITIES

Completed questionnaires were sent from the field to the office for registration directly after the completion of a canal. Office editors reviewed the questionnaires for consistency and completeness, and some problems were resolved in the office prior to data entry. Other problems were returned to the field teams through a summary report written by office staff and sent to the field teams.

Data entry and editing began while interviewers were still in the field. The data were entered and edited on computers using the Integrated System for Survey Analysis (ISSA), a software package developed especially for survey work. Five computers were used for data entry in two shifts. Verification (re-entry) and consistency checks were done to ensure the quality and accuracy of the data entry. Verification started with 100 percent of the questionnaires, then based on the accuracy of the data entry, this percentage was decreased to 50 percent.

Data entry, verification, and editing of data were completed by the end of November. A clean tape was prepared and converted to SPSS under Windows for the analysis.

## 2.6 SURVEY COVERAGE

A summary of the outcome of the fieldwork of the survey by region is presented in Table 2-1. The table shows that the listing, fieldwork and callback effort was extremely successful, with response rates close to 100 percent. A total of 2,582 farmers (men and women) were successfully interviewed. For men farmers, a total of 2,299 questionnaires were completed with a response rate of 98.6 percent. For women farmers, 279 questionnaires were completed with a response rate of 98.6 percent. For the wives subsample, a total of 509 questionnaires were completed with a response rate of 99.8 percent.

<b>Table 2-1 Survey Coverage</b>							
Distribution of farmers' sample and response rates, by sex and region, National Survey 2001.							
Variable & Category	Region						Total
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Ground Water Areas	
<b>Farmers</b>							
Men Sample	297	458	456	412	383	293	2299
Men Interviewed	295	451	451	406	377	287	2267
Response Rate	99.3	98.5	98.9	98.5	98.4	98.0	98.6
Women Sample	66	67	64	61	24	1	283
Women Interviewed	65	66	63	60	24	1	279
Response Rate	98.5	98.5	98.4	98.4	100	100	98.6
<b>Wives</b>							
Wives Sub-sample	80	110	120	107	93	0	510
Wives Sub-sample Interviewed	80	109	120	107	93	0	509
Response Rate	100	99.1	100	100	100	0	99.8

## RESPONDENTS' CHARACTERISTICS

3

This chapter provides a profile of the survey respondents, to help in understanding the results presented in the following chapters. These characteristics include individual and household characteristics.

### 3.1 BACKGROUND CHARACTERISTICS

Table 3-1 presents the distribution of farmers by various background characteristics including age, education, and marital status. The mean age of farmer is 49 years, whether a man or a woman, and 48 among farmers in groundwater areas. The age distribution for men and women is very similar. About 11 percent of the men and women farmers are under age 35, around 55 percent are in-between age 35 and 54, and around 36 percent are of age 55 and over. The oldest men farmers are found in Middle Delta (mean age is 51.2) and the youngest farmers are found in East Delta (47 years).

Table 3-1 Background Characteristics								
Percent distribution of the farmers by background characteristics by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Age								
<35	8.8	7.5	15.5	11.3	13.5	11.5	7.3	11.1
35-44	20.0	22.0	26.6	22.4	15.9	21.7	31.0	21.9
45-54	41.0	32.4	30.2	29.1	30.0	32.0	30.7	34.4
55-64	17.6	21.7	18.0	23.2	25.2	21.2	24.7	21.1
65+	12.5	16.4	9.8	14.0	15.4	13.6	6.3	11.5
Mean Age of Farmer	49.1	51.2	47.0	49.7	50.2	49.3	48.2	48.9
Education								
Never attended school	67.1	53.9	59.9	52.5	62.9	58.6	58.2	90.7
Primary	9.1	24.4	16.8	22.9	10.6	17.5	6.5	5.0
Preparatory	2.7	8.0	6.2	4.9	4.0	5.4	0.7	0.4
Secondary	8.8	7.3	9.2	12.8	15.9	10.8	26.2	1.8
Upper intermediate	1.7	1.8	2.2	2.2	0.3	1.7	1.7	0.7
University	10.5	4.7	5.3	4.7	6.3	6.0	6.2	1.4
Work Status								
Agriculture only	80.7	74.5	67.2	71.4	66.6	71.6	85.7	96.8
Other job plus agriculture	19.3	25.5	32.8	28.6	33.4	28.4	14.3	3.2
Marital Status								
Married	94.2	93.1	94.2	94.1	94.4	94.0	96.2	29.0
Widowed	3.4	4.7	3.1	3.0	0.8	3.0	1.4	67.0
Single	2.4	2.2	2.7	2.7	4.5	2.9	2.4	1.1
Divorced	0	0	0	0.2	0.3	0.1	0	2.9
Number of Farmers	295	451	451	406	377	1980	287	279

There is a clear difference between men and women farmers' levels of education. The vast majority (91 percent) of women farmers have never attended school, while this percentage decreases to 59 percent for men farmers. About 18 percent of men farmers have primary education, while this percentage reaches 5 percent for women farmers. Nineteen percent of men farmers have secondary school and higher education, compared with 4 percent for the women sample. Farmers in groundwater areas are better educated than farmers from other regions, with a higher secondary school completion rate.

Farmers were asked if they do work other than agriculture. Almost one in three farmers (28 percent) have another job. Differences are significant by region: farmers from West Delta are less likely to have another job (19 percent), while farmers from Upper Egypt are more likely to do other work (33 percent). Farmers in groundwater areas are the least likely to have other jobs (14 percent). Only three in ten women farmers have work in addition to their agricultural work.

Most women farmers are widowed (67 percent), while most of the men farmers are married (94 percent) compared to about 30 percent of women farmers. Only a small proportion of men farmers are single or widowed (2.8 percent).

### 3.2 HOUSEHOLD ENVIRONMENT

With regard to garbage disposal by farmers, Table 3-2 presents the distribution of households according to the type of garbage disposal by region and sex. The table shows that 68 percent of men farmers and 64 percent of women farmers use waste as natural fertilizer, with the lowest proportion in East Delta (39 percent) and the highest in Middle Egypt (83 percent). East Delta farmers may well recognize the increased health hazard in their region of using waste as natural fertilizer, due to excess drainage problems. Farmers in groundwater areas are completely different than farmers in other regions in disposing of their wastes and garbage.

Table 3-2 Garbage Disposal								
Place of garbage disposal by region and sex, National Survey 2001.								
Variable & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Garbage Disposal (MR*)								
As natural fertilizer	75.3	79.4	38.6	82.5	65.8	67.5	0.3	64.2
Traditional stove	44.4	67.4	74.1	56.7	70.0	63.8	5.2	69.2
In any empty area	24.4	42.6	17.5	30.3	17.5	26.9	16.7	32.3
Collected by garbage truck	7.1	3.1	14.0	1.7	7.4	6.7	79.1	4.3
In the street	5.1	2.2	3.5	7.6	8.8	5.3	3.5	6.8
In the drain	0.7	3.5	0.7	1.5	0.5	1.5	0	1.4
In the canal	0	3.3	0.9	0.2	0.8	1.2	0	2.2
In the <i>mesqa</i>	0	1.8	0.9	0.2	0	0.7	0	2.9
Other	0	0.2	0.4	0	0.5	0.3	0	0.0
Number of Farmers	295	451	451	406	377	1980	287	279
* MR: Multiple Response Permitted								

Around 80 percent of those farmers reported that their wastes were collected by garbage truck compared to 14 percent of East Delta farmers and 3 percent in Middle Delta. Almost seven in ten men farmers (68 percent) and 64 percent of women farmers burn their wastes and garbage in stoves. Slightly more than one-quarter of men farmers throw wastes in any empty area compared to one-third of women farmers. Around 3 percent of men farmers throw wastes in *mesqas*, canals or drains, compared with 7 percent by women farmers, potentially causing water pollution and reducing the amount of high-quality water available.

### 3.3 LAND HOLDINGS

Table 3-3 provides information on farmers by amount of land cultivated and owned and the ratio of land income to family income by region and sex. There are significant differences between men and women. The average man farmer cultivates 3.5 feddans and owns 3.0 feddans, while the average woman farmer cultivates 1.4 feddans and owns 1.3 feddans. Thirty percent of men farmers cultivate less than one feddan, while more than half of women farmers (56 percent)

cultivate the same area. Sixteen percent of men farmers cultivate 4 feddans or more compared to 4 percent of women farmers. The size of land cultivated and owned is highest in West Delta, and lowest in the Middle Delta.

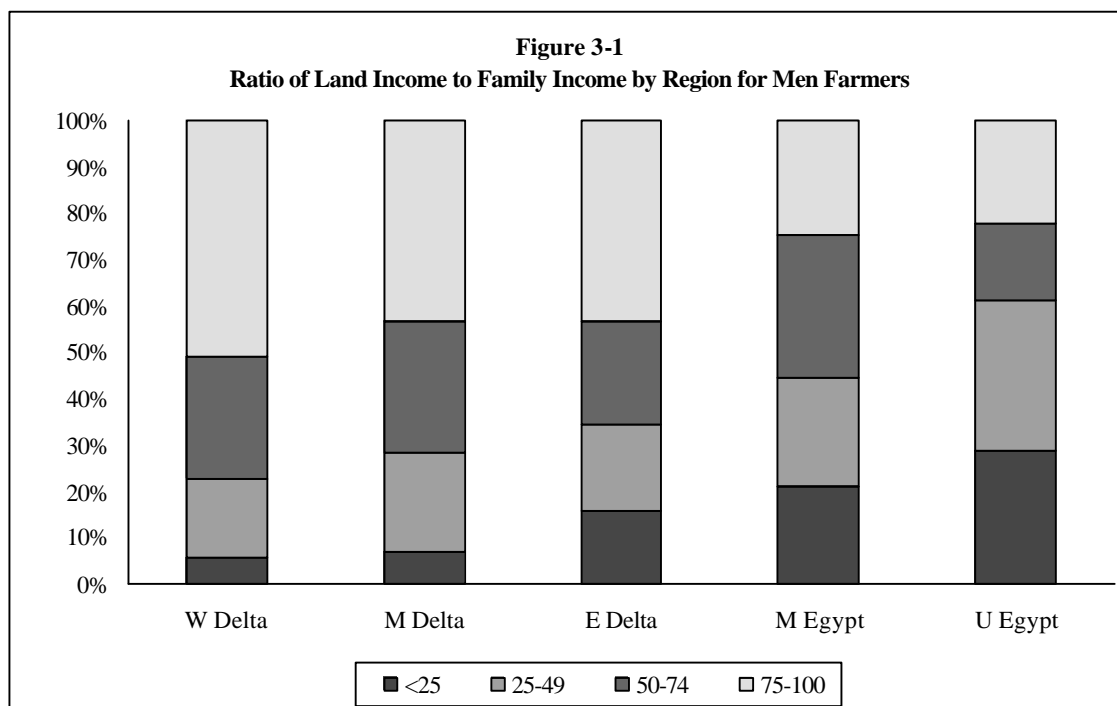
Land holdings in groundwater areas are more than double the size of landholdings in the Nile valley: the mean area cultivated in groundwater areas is 8.1 feddans compared to 3.5 feddans in the Nile valley, and 94 percent of farmers in groundwater areas cultivate 4+ feddans compared to 16 percent in the Nile valley. Farmers in areas using groundwater cultivate on average the largest areas (8.1 feddans), followed by West Delta (6.1) compared with 2.2 feddans in Middle Delta.

**Table 3-3 Land Holdings**

Percent distribution of the farmers by amount of land cultivated and owned by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Cultivated Area								
<1 feddan	18.4	38.4	18.4	33.5	39.8	30.1	0.3	55.9
1-2 feddans	23.8	25.6	22.8	29.6	32.6	26.8	0.3	21.9
2-4 feddans	33.3	18.9	31.3	22.9	14.9	27.1	4.9	17.9
4-6 feddans	6.8	10.9	12.2	6.2	5.3	6.9	13.9	1.8
6+ feddans	17.7	6.2	15.3	7.9	7.4	9.1	80.5	2.5
Mean (in feddans)	6.1	2.2	4.0	3.4	2.3	3.5	8.1	1.4
Owned Area								
None	3.7	4.4	9.1	9.9	3.4	6.3	7.3	2.5
<1 feddan	19.0	42.6	21.3	38.7	42.4	33.4	0.3	57.0
1-2 feddans	22.7	20.8	23.1	23.4	28.9	31.7	0.3	22.6
2-4 feddans	31.2	16.0	24.8	17.7	12.2	11.9	4.2	14.3
4-6 feddans	6.1	11.1	9.1	4.2	5.0	7.3	14.3	1.1
6+ feddans	17.3	5.1	12.6	6.2	8.0	9.4	73.5	2.5
Mean (in feddans)	5.8	2.0	3.1	2.9	2.1	3.0	7.3	1.3
Percentage of Income From Land								
<25	5.8	6.9	16.0	20.9	28.6	15.8	13.6	7.9
25-49	16.9	21.5	18.6	23.4	32.4	22.6	38.7	19.0
50-74	26.4	28.4	22.0	31.0	16.7	24.9	29.3	22.9
75-100	50.8	43.2	43.5	24.6	22.3	36.6	18.5	50.2
Number of Farmers	295	451	451	406	377	1980	287	279

Land income represents a varying proportion of total family income. Just over a third of farmers reported that land income represents 75-100 percent of household income, and around two-third of farmers reported that land income represents 50 percent or more of household income. Land income represents a higher percentage of household income in Delta regions than other regions, as illustrated in Figure 3-1.



# COMMUNICATION

## 4

The Ministry has worked to effect changes in irrigation practices through a wide variety of efforts in many different departments. Among these efforts have been those of the Water Communication Unit (WCU). It is important for the Ministry to gain some indication of the effectiveness of these communication activities, as it seeks to modify and improve its communication program. Respondents were asked about their exposure to specific WCU activities, specifically TV spots, TV programs, and print materials. It is important to note that at the same time the Ministry has been working to convey the message of impending water scarcity, Egypt has enjoyed some years of excess water, including the summer of 2001.

### 4.1 EXPOSURE TO MWRI COMMUNICATION ACTIVITIES

#### 4.1.1 Mass Media

Seven 60-second spots promoted the farmer as businessman, showing him adopting new irrigation methods, conserving water, and increasing his profit as a result<sup>3</sup>. The main topics of the seven spots were:

1. The water problem in Egypt.
2. Rational water use.
3. Water pollution.
4. Water User Associations.
5. The role of the Ministry in providing water.
6. New irrigation projects.
7. Floods.

The TV spots were aired November 1999 – March 2000. The WCU reached an agreement with the Television Authority to air these spots for free. A monitoring firm was hired to monitor the airings from Nov. 1999 – Feb. 2000. These data show that the spots were aired on all Egyptian TV channels a total of 318 times in November, 116 times in December, 99 times in January, and 72 times in February. Peak airings were 40 in November, 59 in December, 8 in January, and 18 in February. However, in April 2000, the spots went off the air, due to a change in leadership at the Television Authority. The airings were not monitored after February 2000, although anecdotal evidence suggests that they have aired very few times since then, and they were not on the air at the time of the survey. Hence, questions concerning the spots are about spots that went off the air about 18 months prior to the survey.

**Recommendation:** When TV spots are aired, hire a firm to monitor their airings over an extended period of time.

Considering that the TV spots were off the air for approximately 18 months prior to data collection, the level of exposure shown in Table 4-1 suggests that the TV spots made a lasting impression. Forty-four percent of men farmers and 22 percent of women farmers reported that they had seen one or more of the spots. Exposure is highest in East Delta, at 55 percent, close to the national average in West Delta, Middle Delta, and Middle Egypt, and very low in Upper Egypt, at 25 percent. Farmers in groundwater areas essentially were completely unexposed to the TV campaign, possibly due to poor television reception, or lack of transmission to their area.

<sup>3</sup> The first six spots were developed under an earlier APRP project, GreenCOM. They can be found at [www.greencom.org](http://www.greencom.org). The seventh spot was developed by the WCU, due to the presence of excess water at the time.

**Table 4-1 Exposure to TV Spots by Region and Sex**

Percent distribution of farmers by TV spots seen and correctly recalled by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Saw at Least One Spot	48.5	45.7	54.5	44.6	24.7	43.9	0.3	21.5
Ever Seen a TV Spot about: (MR)								
Water pollution	32.9	27.5	39.5	31.3	12.7	29.0	*	11.5
Rational water use	18.6	21.7	40.8	29.1	14.9	25.8	*	12.9
New projects	17.3	18.8	36.4	29.1	19.9	24.9	*	7.2
Water problem in Egypt	6.8	7.3	34.1	10.3	6.6	13.8	*	3.6
Role of MWRI	0.3	2.0	14.9	1.2	1.3	4.4	*	1.1
Floods	0.0	0.2	13.5	3.9	1.6	4.2	*	1.4
Water User Associations	0.0	0.2	14.9	0.5	0.5	3.6	*	0.7
Mean Number of Spots Seen	0.8	0.8	1.9	1.0	0.6	1.1	0.0	0.4
Among those who saw a spot								
Percent Who Could Discuss Spot's Content Correctly								
New projects	92.2	98.8	93.3	99.2	93.3	95.5	*	*
Water pollution	89.7	98.4	93.3	100.0	93.8	95.3	*	93.8
Rational water use	85.5	95.9	94.6	100.0	94.6	95.1	*	91.4
Water problem in Egypt	25.0	37.0	89.0	97.6	92.0	86.9	*	*
Floods	--	*	45.2	88.2	*	54.7	*	*
Role of MWRI	*	*	47.8	*	*	54.5	*	*
Water User Associations	--	*	50.7	*	*	52.0	*	*
Number of Farmers	295	451	451	406	377	1980	287	279
* Too few cases to analyze. -- Not applicable.								

The regional pattern of message recall is significant, with East Delta respondents having considerably better recall of all messages than any other region, and reporting seeing almost double the average number of spots than the national average – 1.9 compared to 1.1.

**Recommendation:** Re-air the TV spots, monitor their airings, and consider a study of 500 farmers to measure message recall three months after the end of airings.

The WCU also produced a series of five seven-minute informational TV programs. The five programs concerned:

1. Leveling fields by laser
2. Maintaining canals
3. The Irrigation Improvement Project
4. Water User Associations
5. Rationalizing water use

Again, interviewers were carefully trained to ensure that they knew to which programs they were referring during the interview. Just over a quarter of men (27 percent) reported that they had seen any program, with only 5 percent of women farmers reporting this. Again, exposure in East Delta is significantly and substantially higher than the national average and than any other region, at 54 percent. Exposure to the program about laser land leveling was the highest of the five programs, at 21 percent of men, while exposure to the program about WUAs was the lowest, at 5 percent.

Message recall was high for the laser leveling program, with 76 percent of men farmers who watched a program able to discuss its content correctly. Around half of those who watched the programs on maintaining canals and rationalizing water use were able to discuss the program content correctly. The content of the WUA program was not well recalled by men who saw it. Again, message recall was highest in the East Delta.



**Table 4-2 Exposure to TV Programs by Region and Sex**

Percent distribution of farmers by TV programs seen and correctly recalled by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Saw at Least One Program	20.7	15.7	54.3	16.0	22.0	26.5	0.7	5.0
Ever Seen a TV Program about: (MR)								
Laser leveling	14.6	10.6	46.1	13.3	14.1	20.5	*	3.2
Rationalizing water use	7.5	6.0	37.7	11.3	17.0	16.6	*	3.2
Maintaining canals	4.4	4.7	39.9	5.2	9.0	13.6	*	2.9
Irrigation Improvement Project	1.4	2.2	28.8	2.5	4.2	8.6	*	1.8
WUAs	0.0	0.2	21.7	0.7	0.8	5.3	*	0.4
Mean Number of Programs Seen	0.3	0.2	1.7	0.3	0.5	0.7	*	0.1
Among those who watched a program								
Percent Who Could Discuss Program								
Content Correctly								
Laser leveling	70.5	64.8	82.9	83.1	62.7	75.8	*	*
Rationalizing water use	23.0	32.4	61.2	70.8	75.9	56.4	*	*
Maintaining canals	21.3	28.2	67.8	27.7	38.6	47.4	*	*
Irrigation Improvement Project	*	11.3	34.3	10.8	13.3	21.5	*	*
WUAs	--	*	17.6	*	*	9.1	*	*
Number of Farmers	295	451	451	406	377	1980	287	279
* Too few cases to analyze.								
-- Not applicable.								

### 4.1.2 Print Materials

The WCU has produced a number of print materials, namely posters and brochures. Interviewers were able to show respondents copies of these materials when asking about them. Print materials were distributed by the Ministry to *handasas*, and irrigation engineers were asked to distribute them to agricultural cooperatives and schools.

Interviewers asked about exposure to eight posters and five brochures as shown in Tables 4-3 and 4-4. One in ten men farmers and one in a hundred women farmers had seen any poster. Again, men farmers in East Delta reported the highest level of exposure, at one in three farmers. Exposure to any single poster did not reach seven percent among men farmers nationally. In East Delta, among posters which were seen by at least ten percent of respondents, virtually all farmers could discuss their content accurately.

**Recommendation:** Pretest poster layouts with more and less text, to determine which yields better understanding of the main message.

Interviewers also asked respondents where they had seen the posters. Among farmers who saw a poster, the most likely place to see a poster was the *handasa* (67 percent), the agricultural cooperative (20 percent), or a school (9 percent), a pattern which is also true for farmers in East Delta. Higher exposure to posters in East Delta probably reflects the fact that more East Delta farmers go to their *handasa* than farmers in other regions (not shown in a table).

**Table 4-3 Exposure to Posters by Region and Sex**

Percent distribution of farmers by posters seen by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Saw at Least One Spot	1.0	15.1	29.7	3.4	2.9	11.6	0.7	1.1
Ever Seen a Poster about: (MR)								
Water is expensive	*	4.0	20.4	1.7	1.3	6.3	*	*
Rational water use	*	8.4	12.0	1.7	0.5	5.2	*	*
Quranic verses ( <i>El Baqara</i> )	*	4.2	12.0	2.7	1.1	4.5	*	*
Clean your <i>mesqa</i>	*	1.8	12.9	2.0	0.8	3.9	*	*
Covered drains	*	3.3	7.5	1.5	2.4	3.3	*	*
Quranic verses ( <i>El Haj</i> )	*	2.9	6.2	0.5	1.1	2.4	*	*
Triple blessing	*	1.6	6.0	0.7	0.8	2.0	*	*
Rational use of water	*	1.8	5.1	0.5	0.5	1.8	*	*
Mean Number of Posters Seen	*	0.3	0.8	0.1	0.0	0.3	*	*
Number of Farmers	295	451	451	406	377	1980	287	279
* Too few cases to analyze.								

**Recommendation:** If brochures are developed for farmers, the current distribution method needs to be more focused, possibly on certain regions or on certain topics, backed by support from Cairo.

The five brochures may have been distributed in large numbers, but they did not reach farmers, as shown in Table 4-4. Only 35 farmers of 1,980 reported that they had seen any brochure, while no women or groundwater area farmers had seen one. Those who saw a brochure reported that they had seen it at the *handasa* or the agricultural cooperative. Between the five brochures, 20 to 30 percent

of respondents who saw the brochures reported that someone had explained it to them.

The WCU also distributed print materials through schools. A majority of farmer households do have children at home who attend school – 60 percent of men farmers, 56 percent of farmers in groundwater areas, and 40 percent of women farmers. However, no women or groundwater farmers reported that their schoolchildren had ever brought home information on agriculture or irrigation, and only 1.4 percent of men farmers in the Nile valley reported that their schoolchildren have done so.

**Recommendation:** To use school children as a means of getting printed materials into farmers' homes may require significant changes in materials distribution.

**Table 4-4 Exposure to School-Based Print Materials by Region and Sex**

Percent distribution of farmers who have children and those who are given printed materials about agriculture and irrigation in school by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Have Children in House Who Attend School	48.1	61.2	70.3	60.8	55.7	60.2	56.4	40.1
Among those who have children in school Schoolchildren bring home information on agriculture or irrigation	0.7	1.1	2.5	2.0	0.0	1.4	0.0	0.0
Number of Farmers	295	451	451	406	377	1980	287	279

Brochures were not a popular method of communication among farmers in the PRA study because of the difficulty of illiterate farmers working with written materials. This was especially true of women farmers, among whom the illiteracy rate was higher than among men.

### 4.1.3 Other Materials

The WCU also produced a cassette, in which an Egyptian cleric interprets Quranic verses on water. Interviewers had the cassette to show respondents. Only 5 of 2267 men farmers had seen the cassette, and none of the women farmers, however, 15 farmers had listened to it.

**Recommendation:** Ensuring broader coverage of the cassette may require significant changes in materials distribution, or it may be more suitable for a more focused campaign.

## 4.2 COMMUNICATION CHANNELS

As suggested by the exposure data, information about the channel of communication is very important to a communications program. The right channel for the audience can help to ensure higher exposure and recall, whereas the wrong channel for the audience can result in lower exposure and recall, and a communication program that is not cost-effective.

### 4.2.1 Mass Media Channels

Respondents were asked about some of their favorite people, so that program planners might get an idea of potential spokesmen. There was a great deal of variety in preferences for actresses (the names of 98 actresses were coded), actors (80 names), and singers (78 names), while preferences were somewhat more uniform for TV personalities (56 names coded). Indeed, the one name that stands out in the table is that of Gamal El Shair, the favorite of 22 percent of men farmers and 12 percent of women farmers.

Men and women do agree on some of their favorite actresses and actors, Samiha Ayoub, Nour El Sherif, and Adel Imam. Tarek Allam is also very popular among both men and women farmers.

Table 4-5 Favorite Singer, Actress, Actor, and TV Personality by Sex					
Percent distribution of farmers favorite singer, actress, actor, and TV personality by sex, National Survey 2001.					
Person	Number Coded	Favorite among Men	Percent of Men Citing Favorite	Favorite among Women	Percent of Women Citing Favorite
Singer	78 singers	Mohamed Rushdi	7.6	Fatma Eid	6.8
Actress	98 actresses	Samiha Ayoub	4.5	Samiha Ayoub	5.8
		Faten Hamama	4.5	Hoda Sultan	4.3
		Mona Zaki	4.1	Amina Rizk	4.3
Actor	80 actors	Nour ElSherif	7.7	Youssef Shabaan	6.5
		Adel Imam	6.7	Nour ElSherif	5.4
		Ahmed Zaki	5.3	Mamdouh Abdel Alim	5.4
				Adel Imam	5.0
				Ahmed Adam	4.7
TV personality	56 personalities	Gamal ElShair	21.8	Gamal ElShair	11.8
		Tarek Allam	9.1	Youssef Maati	10.4
		Hamdi Qandil	8.1	Tarek Allam	7.5
Number of Farmers			2267	279	

## 4.2.2 Interpersonal Channels

Farmers were asked from where they obtain their most useful information about irrigation. As shown in Table 4-6, friends or relatives was the most popular source nationwide, especially for women farmers, cited by 48 percent of women compared to 23 percent of men. In groundwater areas, however, the most frequently mentioned was the irrigation engineer (57 percent). For both men and women, other farmers is the second best source of information, while for groundwater farmers, it is the *Bahar*.

**Recommendation:** Need to make communication materials using popular film stars and singers to attract audience to message.

Eight in ten men farmers and more than half of women farmers know the head of the agricultural cooperative and their *Bahar*, while very few farmers know their agricultural extension worker. In groundwater areas, farmers seem well connected to these sources of information.

A surprisingly high proportion of men farmers know the correct name of their *Bahar*: Eight in ten farmers in groundwater areas, and seven in ten farmers in the Nile valley. This proportion is lowest in Upper Egypt (59 percent), and highest in West Delta (98 percent).

**Recommendation:** Need to make childrens' materials on water management using images to draw their attention, e.g "Bakar" or "Mickey Mouse".

**Table 4-6 Interpersonal Channels of Communication for Irrigation Information by Region and Sex**

Percent distribution of farmers source of information about irrigation by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
<b>Best Source of Information:</b>								
Irrigation engineer	6.1	10.2	14.2	10.1	4.0	9.3	57.1	1.8
Agriculture employee or agriculture cooperative	2.0	7.8	13.1	38.2	18.8	16.5	0.0	8.6
<i>Bahar</i>	36.3	34.6	36.1	18.0	23.9	29.7	38.7	17.9
TV/radio	4.1	3.1	8.2	2.5	4.5	4.5	0.3	1.4
Other farmers	32.5	43.2	25.5	33.7	27.3	32.6	10.5	48.0
Friends or relatives	14.2	41.7	17.7	22.9	15.9	23.4	1.7	48.4
Own experience	45.8	57.0	44.3	55.4	60.5	52.8	21.3	29.0
<b>Percent Who Know their:</b>								
Head of agriculture cooperative	93.9	77.8	83.4	88.2	66.8	81.5	76.0	60.9
<i>Bahar</i>	98.6	80.9	84.0	76.1	66.0	80.5	79.1	52.7
Agriculture extension supervisor	70.2	35.0	60.1	44.9	30.5	47.1	73.5	31.9
Bank manager	46.1	48.6	40.6	48.0	47.2	46.0	72.5	15.8
Ag extension worker	2.0	10.4	6.4	2.2	4.5	5.5	0.0	1.4
<b>Percent Who Know the Correct Name of their:</b>								
<i>Bahar</i>	97.6	79.4	70.3	59.4	58.8	72.0	79.1	48.0
Head of agriculture cooperative	89.2	67.8	60.8	78.1	54.4	68.9	72.5	46.6
Bank manager	45.4	44.1	25.1	44.6	42.7	39.8	72.5	10.4
Agriculture extension supervisor	61.7	29.7	36.8	30.9	18.8	34.3	62.7	23.3
Irrigation engineer	33.7	34.8	27.9	30.8	8.2	27.2	77.0	5.4
Ag extension worker	*	8.6	4.0	*	2.7	3.7	--	*
<b>Number of Farmers</b>	<b>295</b>	<b>451</b>	<b>451</b>	<b>406</b>	<b>377</b>	<b>1980</b>	<b>287</b>	<b>279</b>

\* Too few cases to analyze  
 -- Not applicable.

The PRA study showed that the main preferred sources of information about water management were television, and meetings with agricultural extension officers.

The reasons for preferring TV were that it is accessible, widespread, addresses people of all age groups and all levels of education. Participants also expressed their enthusiasm for learning through plays, as they often identify themselves with the characters in the play.

Meetings with extension officers, however, provide an opportunity for farmers to pose practical questions, and it allows for discussion. Farmers easily understand extension officers themselves. Female farmers especially preferred the idea of meeting with extension officers. The best time for these visits would be in the work fields in the daytime, or otherwise in their homes.

### 4.3 PATTERNS OF COMMUNICATION WITH THE MINISTRY

As one of the Ministry's main objectives is to increase farmer participation in decision-making concerning water use, privatization of water resource management, information on communication between farmers and the Ministry is very important. The questionnaire posed a number of questions about communication between:

- Farmers and irrigation engineers.
- Farmers and the *hood* observer (concerning matching farmers' water requirements to the amount of water provided to them).
- Farmers and drainage engineers.
- Farmers and the Ministry (primarily concerning the resolution of complaints).

Table 4-7 shows that in the Nile valley, about one in ten farmers (13 percent) typically visit their irrigation engineer per year – and that most of those visits occur in the summer, the busy season. This percentage is almost double in groundwater areas, at 23 percent, while women farmers almost never visit their irrigation engineer.

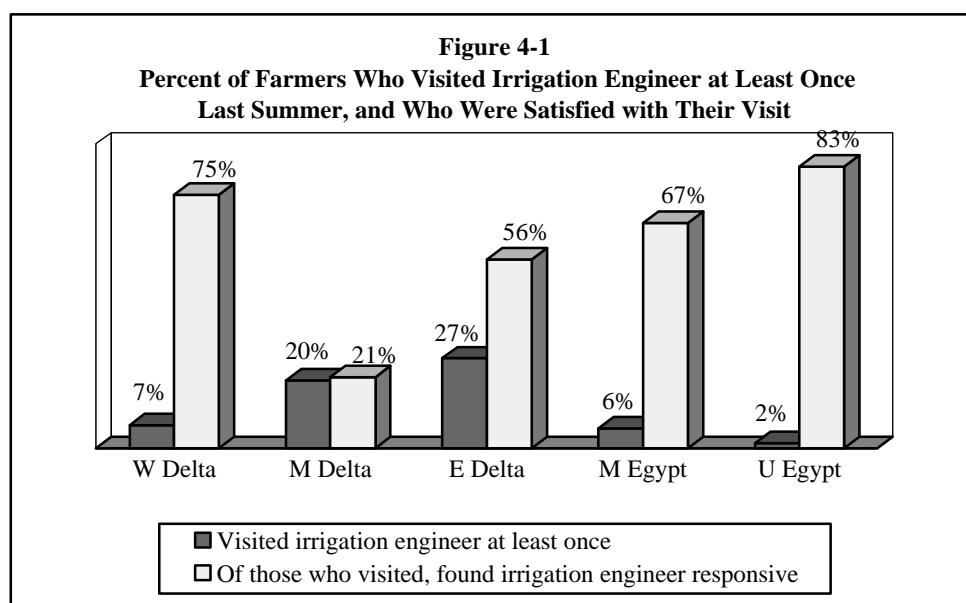
Table 4-7 Communication Between Farmers and District Irrigation Engineers by Region and Sex									
Percent distribution of farmers who visited irrigation engineer by region and sex, National Survey 2001.									
Variables & Category	Men						Ground Water Areas	Women	
	Region								
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total			
Visited Irrigation Engineer at Least Once									
Last summer	6.8	20.0	25.3	5.4	1.3	12.7	23.3	0.7	
Last winter	1.4	9.3	5.6	2.2	0.8	4.2	15.7	0.4	
Any season (total)	6.8	20.0	26.6	5.9	1.6	13.1	23.3	0.7	
Mean Number of Times Farmer Visited Irrigation Engineer									
Last summer	0.2	1.3	1.4	0.2	*	0.7	0.7	*	
Last winter	*	0.3	0.5	*	*	0.2	0.2	*	
Of those who visited their irrigation engineer									
Irrigation engineer responded to farmers' needs	75.0	21.1	55.8	66.7	83.3	46.9	89.6	*	
Number of Farmers	295	451	451	406	377	1980	287	279	
* Too few cases to analyze.									

By region, a farmer in East Delta is five times more likely to visit his irrigation engineer in the summer than a farmer in Middle Egypt – but he is less likely to be satisfied by his visit than a Middle Egyptian farmer, as illustrated in Figure 4-1. While farmers in Upper Egypt rarely visit their irrigation engineers,

**Recommendation:** Investigate ways to improve customer satisfaction with district irrigation engineers in Middle Delta, where among those who visited their irrigation engineer, only 21 percent said the engineer responded to their needs.

**Recommendation:** For better matching of irrigation delivery with crop water requirement WCU needs to have materials that draw farmers' attention and interest.

when they do visit, they have the highest level of customer satisfaction. The lowest level of customer satisfaction is found in the Middle Delta, where only 21 percent of farmers reported that they found their irrigation engineer responsive to their needs. These findings may reflect several factors: varying workloads in different regions, and possibly varying levels of support by the Ministry to different regions.



When asked why they visited the irrigation engineer, most farmers said it was to ask for more water (71 percent), while a minority was seeking assistance with cleaning the canal (8 percent). Farmers were also asked where is the best place to meet the irrigation engineer – 84 percent said in his office at the *handasa*, and 13 percent said in the field (not shown in a table).

Communication is a two-way process, and so farmers were also asked about the irrigation engineers' efforts at initiating communication with farmers. Table 4-8 shows that in the Nile valley, irrigation engineers generally do not ask the farmer's opinion about water management topics such as branch canal operation, scheduling cleaning, the water delivery schedule, garbage in canals, and illegal outtakes. However, engineers are much more likely to initiate these conversations with farmers in groundwater areas, and they are slightly more likely to broach these subjects with farmers in the East Delta. Women farmers reported that irrigation engineers virtually never ask their opinions on these topics. In contrast, almost every farmer would like the irrigation engineer to ask their opinion on these topics.

As a way of measuring farmers' perception of efforts made by the irrigation engineers, interviewers asked them if they had seen the irrigation engineer on the branch canal or drain last summer. A quarter of all men farmers in the Nile valley saw their irrigation engineer on the branch canal or drain last summer, compared to just over half of farmers in groundwater areas (52 percent) and only a small percentage of women farmers (6 percent). Between regions, farmers in

East Delta are far more likely to have seen their irrigation engineer outdoors, at 47 percent. While the mean number of times is 1.2 for the Nile valley, it is double in groundwater areas, at 2.4, and 2.5 in East Delta versus 0.2 in Upper Egypt – reflecting the greater number of problems in East Delta and the smaller number of problems in Upper Egypt.

Table 4-8 Communication Between District Irrigation Engineers and Farmers by Region and Sex								
Percent distribution of farmers who communicate with the irrigation engineer by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Has the Irrigation Engineer Ever Asked the Farmer's Opinion About:								
Delivery schedule	1.0	5.5	13.7	8.4	2.9	6.8	29.3	0.7
Branch canal operation	0.0	4.4	14.4	4.9	0.8	5.5	0.0	0.7
Scheduling cleaning	0.3	2.9	11.1	9.6	1.3	5.5	26.1	0.7
Garbage in canals	0.0	2.4	11.6	5.7	0.8	4.5	0.0	0.7
Illegal outtakes	0.7	3.3	9.3	5.2	0.3	4.1	31.7	0.7
Would Like the Irrigation Engineer to Ask their Opinion About Topics Listed Above	92.5	93.6	96.5	91.4	86.7	92.3	88.9	62.0
Saw the Irrigation Engineer on the Branch Canal or Drain Last Summer at Least Once	12.5	29.7	46.5	24.4	7.4	25.6	51.9	6.1
Mean Number of Times Farmer Saw Irrigation Engineer on the Branch Canal or Drain Last Summer	0.4	1.4	2.5	0.9	0.2	1.2	2.4	0.5
Among those who saw the irrigation engineer on the branch canal or drain last summer at least once								
Irrigation engineer spoke to farmers when he was on the branch canal	51.4	42.9	69.9	63.3	64.3	59.8	87.2	47.1
Number of Farmers	295	451	451	406	377	1980	287	279

When irrigation engineers do leave their offices to go to the branch canal or drain, more than half of them do speak to farmers (60 percent), while in groundwater areas they are even more interactive with farmers, where 87 percent of farmers reported that the engineer spoke to farmers while in the field. This percentage is fairly consistent across regions, although somewhat lower in Middle Delta (43 percent).

The questionnaire also posed questions about the second type of engineer whom the farmer might meet: the drainage engineer. In the Nile valley, 6 percent of men farmers had ever spoken with the drainage engineer, compared to 33 percent in groundwater areas, and 1 percent of women farmers. Drainage engineers may be most active in East Delta, where 20 percent of farmers had ever spoken with him. Remaining percentages are 4 percent in Middle Delta, 2 percent in Middle Egypt, 1 percent in West Delta, and 1 percent in Upper Egypt, where there is no drainage problem (not shown in a table).

Table 4-9 discusses communication between farmers and the *hood* observer. The task of the *hood* observer, a Ministry of Agriculture employee, is to gather information about what crops farmers intend to plant and when. This data is collected provided to the Ministry of Water Resources and Irrigation, which uses the data to match water requirements at the *mesqa* level with water releases from Lake Nasser and throughout the irrigation system. When water requirements and water

availability do not match, it is referred to as "mismatch." This system is not in operation in groundwater areas.

The data suggest that *hood* observers typically use a sample of about 13 percent of farmers to gather the data they need about water requirements, although there are substantial variations by region: from 2 percent of farmers in Upper Egypt to 43 percent in East Delta. The data also suggest that the *hood* observer visits selected farmers frequently during the busy season: an average of almost six visits per farmer in August and September 2001. By region, *hood* observers also vary significantly the number of visits per farmer, from 1.4 visits in that two-month period in West Delta, to 7.4 times in East Delta.

Table 4-9 Communication Between Farmers and the Hood Observer by Region and Sex								
Percent distribution of farmers who communicate with the hood observer by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
The Hood Observer has Ever Asked the Farmer What He Intends to Plant and When	12.9	3.5	42.6	1.0	2.4	13.1	0.0	12.9
Among those whom the hood observer has ever visited:								
Mean number of times he saw the farmer in August and September 2001	1.4	2.2	7.4	1.5	1.9	5.9	--	5.2
Among those whom the hood observer has ever visited:								
Likelihood that the Farmer will Actually Plant What He has Told the Hood Observer He Would Plant								
Always	92.1	12.5	58.9	*	*	60.2	--	72.2
Usually	0.0	37.5	12.0	*	*	12.4	--	5.6
Sometimes	0.0	25.0	19.8	*	*	17.0	--	11.1
Infrequently	0.0	0.0	1.6	*	*	1.9	--	0.0
Rarely	7.9	25.0	7.8	*	*	8.5	--	11.1
Number of Farmers	295	451	451	406	377	1980	287	279
* Too few cases to analyze.								
-- Not applicable.								

Mismatch can occur due to weaknesses in the *hood* observer's data collection system, in terms of how many farmers he visits and how often he goes back to double-check the information the farmer gives him. Mismatch can also occur, however, when the farmer changes his mind about what he will plant after giving this information to the *hood* observer. Among farmers who have ever been visited by the *hood* observer, 73 percent said that they usually or always plant what they have told the observer they will plant, while remaining 27 percent say that they sometimes, infrequently, or never plant what they have told the observer they will plant.

Much of farmer-initiated communication with the Ministry at all levels concerns complaints, and these are described in Table 4-10. Farmers reported whether they had lodged a complaint through political channels, such as through a member of a political party of a community council. In the Nile valley, one in ten farmers had lodged such a complaint in the preceding twelve months, compared to no farmers in groundwater areas, and three percent of women farmers. There was a substantial difference between regions, where 20 percent of farmers in the Middle and East Delta had lodged such complaints, versus 8 percent in West Delta, 3 percent in Middle Egypt, and 1 percent in Upper Egypt.



Only 11 percent of farmers in the Nile valley who lodged such a complaint said they had been satisfied or somewhat satisfied with the result.

The PRA study provides additional detail. In the summer, when there are water shortages, conflicts may arise between farmers and the authorities responsible for water management. Farmers sometimes send telegrams – for example to the Ministry of Health, the Ministry of the Environment, the Minister of Water Resources and Irrigation, and even the Prime Minister, requesting additional water. Farmers may assemble a delegation to approach the *handasa* or directorate, or ask their representative from the local council to present their case to the *handasa* or directorate.

**Table 4-10 Communication Between Farmers and the Ministry by Region and Sex**

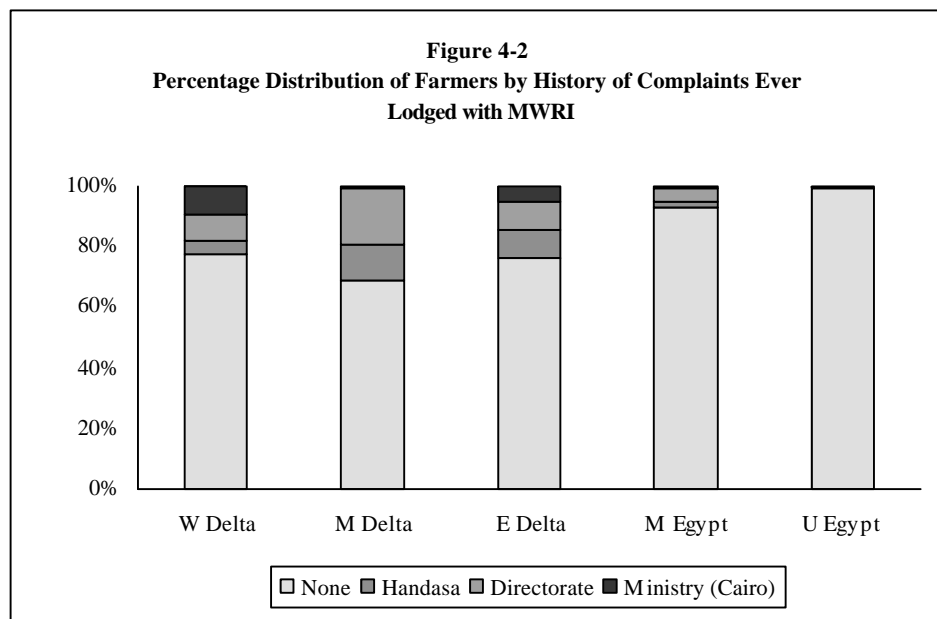
Percent distribution of farmers who communicate with the Ministry by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Lodged a Complaint through Political Channels in the Last 12 Months	7.8	20.2	19.5	2.5	0.5	10.8	0.0	2.5
Of those who lodged a complaint through political channels:								
Satisfied or somewhat satisfied with the result	13.0	9.9	10.2	20.0	*	11.2	--	*
Complaint Lodged at the Level of:								
No complaint lodged	78.0	66.5	76.7	93.3	99.2	82.3	99.7	94.3
Handasa	4.1	11.3	9.3	1.7	0.3	5.7	0.3	1.4
Directorate	8.8	18.2	9.1	4.4	0.5	8.5	0.0	3.6
Ministry (Cairo)	9.2	4.0	4.9	0.5	0.0	3.5	0.0	0.7
Of those who lodged a complaint with the Ministry:								
Mean Level of Satisfaction with Results								
Handasa	4.8	4.1	3.8	*	*	4.0	*	*
Directorate	4.8	4.2	3.7	4.2	*	4.2	--	4.4
Ministry (Cairo)	4.6	4.8	3.8	*	*	4.2	--	*
Topics Farmer Would Like to Discuss with the Ministry, if He had the Opportunity								
More water	51.2	56.1	66.7	76.4	41.1	59.1	5.2	67.4
Clean canal	13.9	37.7	16.4	35.2	26.3	26.6	1.0	17.6
Drainage/covered drains	1.7	36.4	17.7	21.4	27.9	22.3	6.6	10.4
Regular rotations	9.8	25.1	13.1	19.5	18.6	17.7	1.4	14.3
Nothing	2.0	1.6	4.7	1.7	10.6	4.1	67.0	7.5
Line the mesqa	1.7	0.0	1.8	0.0	0.0	0.7	33.0	0.0
Number of Farmers	295	451	451	406	377	1980	287	279
* Too few cases to analyze.								
Level of satisfaction: 1 – very satisfied, 2 – satisfied, 3 – neutral, 4 – dissatisfied, 5 – very dissatisfied.								
-- Not applicable.								

Farmers are more likely to lodge a complaint at some level of the Ministry than through political channels. Eighteen percent of farmers in the Nile valley have ever lodged a complaint at either the *handasa*, directorate, or Ministry level. In contrast, virtually no farmer in groundwater areas has

ever lodged such a complaint, and only a few women farmers have done so (6 percent). Figure 4.2 illustrates these data.

The table also shows that while only a small proportion of farmers lodge complaints, most of those who do so claim they are not satisfied with the results. They report a mean level of satisfaction with results of "dissatisfied" (4.0-4.2) at all three levels of the Ministry.



When asked what they would like to discuss with a senior official at the Ministry if they had the opportunity, 59 percent of men and 67 percent of women farmers said they would request more water. Twenty-seven percent of men and 18 percent of women would discuss cleaning the canal. Problems with drainage and irregular rotations were also cited frequently by men farmers, although not as frequently by women farmers. Farmers in groundwater areas are generally satisfied with their irrigation situation.

According to PRA participants, the lack of coordination between the irrigation and drainage departments works to the farmer's disadvantage. The other problems cited paralleled the survey findings: frequent canal cleaning, upgrading the drainage system, covering drains in residential areas, and introducing sewage systems in residential areas. They also mentioned their need for a service center for maintaining pumps.

## 4.4 SOURCES OF INFORMATION

### 4.4.1 Crop Selection

Table 4-11 discusses how farmers obtain information about crop selection. About half of farmers in the Nile valley (48 percent), two-thirds of farmers in groundwater areas, and eight in ten women farmers do seek advice from others in deciding what crops to plant. Upper Egyptian and West Delta farmers are fairly self-reliant, only about a quarter of whom seek advice from others on crop selection. However, East Delta farmers are highly likely to seek advice – 71 percent do so. When farmers seek advice, farmers in the Nile valley go to other farmers, relatives, the agricultural cooperative, and their wives. Farmers in groundwater areas go to their agricultural engineer and the agricultural cooperative for advice; and women farmers use all of these sources, including their children. There are distinctly different patterns by region.

The Ministry has worked to introduce crops that require less water, such as short-season rice. Farmers were asked whether they had the information needed to make good choices about which crops to try. One-third of farmers in the Nile valley said they did receive information, versus only 6 percent of farmers in groundwater areas and 11 percent of women farmers. Farmers in the Middle Delta consider themselves well informed, with 77 percent of men farmers saying they have the information they need. Table 4-11 shows that if a farmer has enough information about a new crop, he usually also has information about the water that crop will require. In the Nile valley, farmers generally get this information from personal experience and the agricultural cooperative. Farmers who do not have this information say they would expect to get it from the agricultural cooperative, relatives/neighbors, and other farmers.

Table 4-11 Information About Crop Selection by Region and Sex								
Percent distribution of farmers who seek advice for crop selection and have the information needed to choose a new crop by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Seek Advice for Crop Selection from Others	24.1	62.5	71.2	43.3	26.0	47.9	65.5	81.7
Seek Advice from (MR)								
Other farmers	13.2	45.2	36.4	23.2	18.3	28.8	9.1	42.7
Relatives	6.8	29.0	16.4	17.2	8.0	16.4	2.8	33.0
Agriculture cooperative	4.1	11.3	25.1	8.1	6.6	11.8	40.4	12.5
Wife	3.7	18.0	10.9	14.3	0.8	10.2	0.3	6.5
Children	1.4	7.1	8.9	7.9	1.3	5.7	0.0	14.3
Agriculture engineer	2.7	2.0	15.7	0.7	0.3	4.6	45.6	2.2
Irrigation engineer	0.0	0.9	2.2	0.0	0.0	0.7	0.3	0.0
Mass media	0.3	0.2	0.2	0.0	0.0	0.2	0.0	0.4
Have the Information Needed to Make Good Choices About Trying New Crops	76.6	39.5	41.5	9.6	7.4	33.2	6.3	10.8
Among those who have information about trying new crops								
Have information about the water requirements of new crops	91.6	73.0	65.8	74.4	89.3	78.1	100.0	80.0
Among those who have information about water requirements of new crops								
Source of Information About Water Requirements of New Crops (MR)								
Personal experience	56.5	61.5	61.0	75.9	44.0	59.3	94.4	37.5
Agriculture cooperative	45.9	33.8	39.0	37.9	52.0	41.1	11.1	20.8
Farmers	26.6	44.6	21.1	20.7	16.0	29.0	0.0	50.0
Relatives/neighbors	7.7	41.5	24.4	10.3	8.0	20.4	0.0	33.3
TV	12.1	17.7	20.3	6.9	16.0	15.4	0.0	20.8
Manuals	11.1	6.2	7.3	20.7	8.0	9.3	11.1	4.2
Merchants	0.0	0.0	1.6	0.0	0.0	0.4	0.0	0.0
Among those who do not have information about water requirements of new crops								
Expected Source of Information About Water Requirements of New Crops (MR)								
Agriculture cooperative	88.6	50.8	73.8	74.8	52.0	64.7	87.0	39.8
Farmers	17.0	62.9	14.9	33.2	34.7	35.0	4.8	41.3
Relatives/neighbors	3.4	54.5	16.8	35.8	31.8	32.7	11.9	54.3
TV	8.0	19.9	12.2	10.9	9.1	12.6	0.0	3.5
Merchants	0.0	9.7	3.0	3.4	0.3	3.8	1.1	0.4
Manuals	4.5	1.6	3.7	2.1	1.1	2.3	2.2	0.8
Other	0.0	1.2	7.3	0.8	0.9	2.3	7.4	5.9
Number of Farmers	295	451	451	406	377	1980	287	279

According to PRA participants, farmers are most interested in receiving information about the best times to irrigate and to plant their crops, new types of crops, symptoms of agricultural diseases and how to treat them, and chemical hazards.



MWRI should have a comprehensive communication program to cover these & other topics.

#### 4.4.2 Water Rotation

Almost all farmers are delivered water on a rotational basis. As shown in Table 4-12, about half of farmers in the Nile valley cited their *Bahar* and their own experience as the source of their information about the rotation, while about a third cited their neighbors and a smaller proportion (15 percent) cited the agricultural cooperative. Most farmers in groundwater areas do not receive their water on rotation. These sources of information do vary by region, with no farmers in the West Delta relying on the agricultural cooperative, compared to 34 percent of farmers in Middle Egypt, for example.

Table 4-12 Source of Information About the Water Delivery Schedule (Rotation) by Region and Sex								
Percent distribution of farmers source of information about rotation by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Among those whose water is delivered on rotation								
Source of Information About the Rotation (MR)								
Bahar	77.6	52.3	57.0	47.8	41.6	54.2	25.4	32.6
Self	16.9	62.1	44.6	49.3	53.3	47.1	0.0	10.0
Neighbors	5.8	44.6	22.6	42.9	31.6	31.0	2.1	57.3
Ag coop	0.0	6.7	11.3	34.0	19.6	14.8	0.0	10.0
Handasa	2.7	12.2	11.8	4.2	1.9	7.1	6.3	1.8
Agriculture directorate	0.0	0.4	1.1	1.0	0.0	0.6	0.0	0.4
Number of Farmers	295	451	451	406	377	1980	287	279

#### 4.5 CHANGES IN COMMUNICATION

Table 4-13 shows a significant increase for five communication indicators.

The data show a significant increase in the proportion of men who saw a TV spot about both conservation and pollution of irrigation water, although the difference among women was not significant.

The data also show a significant increase among men farmers who know the correct name of their irrigation engineer, which might indicate increased communication with their engineers. This conclusion is substantiated by the significant increase in the proportion of farmers who met with their engineer last year, which rose among men from 9 percent to 13 percent. The table also shows that the proportion of men farmers who sought advice in crop selection increased from 29 percent in 1998 to 48 percent in 2001.

The mean number of times the farmer met with the engineer remained essentially unchanged (ie., the change was not significant), as did the proportion of farmers who have information they need about new crops to try, and the proportion who sought advice in crop selection from the irrigation engineer.

The data also show a significant drop in the proportion of farmers who say that they have the information they need about the water requirements of new crops. This may imply an actual drop in the proportion, or, if it reflects a growing realization about the importance and cost of the water requirement, it may reflect a more accurate measurement of the proportion.

**Table 4-13 Comparison of Levels of Communication About Water Issues Between 1998 and 2001 by Sex**

Percentage distribution of farmers by levels of communication about water issues between 1998 and 2001 by sex, National Survey 2001.

Communication Indicator	Men		Women	
	1998	2001	1998	2001
<b>Mass Media</b>				
Ever seen a TV spot about conservation of irrigation water	18.5	<b>25.8</b>	7.4	12.9
Ever seen a TV spot about pollution of irrigation water	23.3	<b>29.0</b>	6.4	11.5
<b>Communication with Irrigation Engineer</b>				
Know the correct name of your irrigation engineer	8.1	<b>27.2</b>	2.7	5.4
<b>Met with Irrigation Engineer Last Year</b>	9.4	<b>13.1</b>	0.5	0.7
<b>Mean Number of Times Met with Irrigation Engineer</b>				
Last summer	0.5	0.6	0.0	0.0
Last winter	0.1	0.1	0.0	0.0
<b>Take Irrigation Engineer's Advice in Crop Selection</b>	0.0	0.7	0.0	0.0
<b>Information About Crop Selection</b>				
Get advice in crop selection	29.4	<b>47.9</b>	38.8	<b>81.7</b>
<b>Have the Information Needed About New Crops to Try</b>	35.6	33.2	14.4	10.8
<i>Among those who have information about new crops</i>				
Have information about the water requirements of new crops	88.2	<b>78.1</b>	85.2	80.0
<b>Topics Farmers Wish to Discuss with Senior MWRI Official</b>				
Increase amount of water	79.9	<b>59.1</b>	83.0	<b>67.4</b>
Clean the canal	26.3	26.6	12.2	17.6
Drainage problems	1.7	<b>22.3</b>	0.5	<b>10.4</b>
Water on rotation	15.8	17.7	7.4	14.3
<b>Number of Farmers</b>	<b>1910</b>	<b>1980</b>	<b>188</b>	<b>279</b>
*Figures in <b>bold</b> are significantly different from 1998 figures at p<0.01.				



## **FARMERS' KNOWLEDGE OF WATER AND IRRIGATION 5**

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Farmers' attitudes and practices towards water management are based in part on their knowledge of water issues and irrigation practices. Farmers' attitudes towards water conservation, for example, may be influenced by their knowledge of national water scarcity. In another example, a farmer who has never heard of laser land leveling probably will not seek information about how to adopt this modern technique. Hence, it is important that the Ministry understands and tracks farmers' knowledge of water, irrigation and agriculture before it can expect to see changes in farmers' water management practices.

This chapter presents findings on knowledge of national water issues, knowledge of irrigation practices, and changes in levels of knowledge between 1998 and 2001. In addition to differentials by region, differentials by education are also highlighted.

### **5.1 KNOWLEDGE OF NATIONAL WATER ISSUES**

To assess the farmers' level of knowledge concerning water and irrigation issues, farmers were asked a series of questions concerning the main source of water, the countries that share Nile water with Egypt, Egypt's quota of water from the Nile, the likelihood of an increased quota, the scarcity of water in Egypt and the largest agricultural projects in Egypt. Table 5-1 presents the percent distribution of farmers by their knowledge of the water situation in Egypt.

Virtually all men farmers (98 percent) knew that the main source of water is the Nile, while only 85 percent of women farmers knew this fact. Virtually all men farmers (98 percent) and around 91 percent of women farmers knew that agriculture consumes the most water in Egypt.

Farmers were also asked about major national agricultural projects because knowledge of these major projects may make farmers aware of the increasing demand for water, and because the Ministry may wish farmers to be aware of the work they are undertaking to provide water for the nation. When asked if they could name the biggest agricultural development projects in Egypt, 78 percent of men farmers in the Nile valley named Tushka, which is under development, compared to 88 percent of farmers in groundwater areas and 39 percent of women farmers. In comparison, only about a third of men farmers named El Salam Canal, which is open, and 5 percent of women farmers could name it. In fact, 59 percent of women respondents could not name any major agricultural project compared with 17 percent of men respondents in the Nile valley.

When respondents were asked about the possibility of water scarcity in the future, three interesting patterns emerge. First, men farmers are much more knowledgeable about the possibility than women farmers: around two-fifth of men farmers expect a problem in the future compared to around a fifth of women farmers. Second, more than one third of respondents said that they are definitely not expecting a problem in the futures. Third, the bulk of women respondents and around a fifth of men respondents simply did not know whether there was likely to be a problem in the future or not.

Respondents were not knowledgeable about the large number of countries which share the Nile and which therefore have their own growing needs for water. Only 3 percent of men respondents in the Nile valley and one percent of women respondents knew that there are ten countries sharing the Nile, versus 11 percent of farmers in groundwater areas. The majority of men farmers mentioned a figure less than nine and the majority of women respondents said that they didn't know. The average number of countries cited by the respondents was half the actual number.

Another key piece of knowledge is whether there is any fluctuation in the amount of water available. Most men farmers (52 percent) knew that the amount of water was fixed, but a substantial proportion, 16 percent, didn't know whether it was fixed or variable. In contrast, most women farmers didn't know, while around one fifth knew that the amount of water was fixed.

Since a fixed water supply has dramatic implications for a growing population, it is important for farmers to know this information.

Table 5-1 Farmer's Knowledge About Water Situation in Egypt by Region and Sex								
Percent distribution of farmers' by knowledge about water situation by region and sex, National Survey 2001.								
Variable & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
<b>Main Source of Water in Egypt</b>								
Nile	100.0	98.7	94.7	99.5	97.9	98.0	99.7	84.6
Other answer	0.0	1.3	5.3	0.5	2.1	2.0	0.3	15.4
<b>Which Sector Consumes the Most Water</b>								
Agriculture	98.3	100.0	95.8	97.3	94.7	97.2	100.0	90.7
Households	1.0	0.0	2.7	2.0	1.1	1.4	0.0	6.1
Don't know	0.3	0.0	0.9	0.5	3.7	1.1	0.0	2.9
Industry	0.3	0.0	0.7	0.2	0.5	0.4	0.0	0.4
<b>Ever Heard of Irrigation Projects: (MR)</b>								
Toushka	83.7	81.2	62.1	86.7	78.2	77.8	87.8	39.4
El Salam Canal	38.0	20.8	45.9	33.7	18.6	31.3	36.9	5.4
East El Ewaynat	6.1	6.0	16.9	18.0	9.8	11.7	69.7	2.5
Other	0.0	0.2	0.4	0.2	0.5	0.3	0.0	0.0
Don't know	8.5	16.9	22.8	12.8	21.5	17.0	5.9	58.8
<b>Scarcity of Water in Future</b>								
Serious	41.0	27.5	24.2	8.1	9.5	21.4	15.0	13.3
Not serious	23.7	20.4	22.0	20.4	15.4	20.3	34.5	5.7
No problem	28.5	25.5	40.8	34.0	57.6	37.3	43.2	33.3
Don't know	6.8	26.6	13.1	37.4	17.5	21.1	7.3	47.7
<b>Number of Farmers</b>	<b>295</b>	<b>451</b>	<b>451</b>	<b>406</b>	<b>377</b>	<b>1980</b>	<b>287</b>	<b>279</b>
<b>Number of Countries Sharing the Nile with Egypt</b>								
<9	76.6	69.4	56.6	71.5	46.9	63.9	51.4	36.0
9	3.1	5.4	2.4	4.5	2.7	3.3	10.8	0.4
10	0.7	6.1	2.1	3.2	2.2	3.0	6.6	1.3
11+	0.0	0.0	0.2	0.2	0.8	0.3	0.0	0.4
Don't know	19.9	19.1	38.7	20.5	47.4	29.2	31.1	61.9
<b>Mean (Among Valid Responses)</b>	<b>4.4</b>	<b>5.0</b>	<b>4.2</b>	<b>5.0</b>	<b>5.2</b>	<b>4.8</b>	<b>6.1</b>	<b>3.6</b>
<b>Amount of Water for Egypt</b>								
Fixed quota	40.0	49.9	46.2	55.9	65.6	51.8	61.2	18.6
Variable quota	56.6	35.7	22.3	36.6	17.3	32.6	29.7	40.3
Don't know	3.4	14.4	31.5	7.4	17.1	15.5	9.1	41.1
<b>Can Egypt Negotiate a Higher Quota of Water</b>								
Yes	49.2	51.5	48.8	82.7	71.3	60.8	52.4	42.8
No	20.7	22.0	16.0	8.4	9.8	15.3	29.4	4.2
Don't know	30.2	26.5	35.2	8.9	19.0	23.9	18.2	53.0
<b>Number of Farmers</b>	<b>295</b>	<b>445</b>	<b>426</b>	<b>404</b>	<b>369</b>	<b>1937</b>	<b>286</b>	<b>236</b>

When asked if they thought Egypt could negotiate a larger quota of water, around 61 percent of men respondents said they thought Egypt could do so, while most women farmers did not know. This may be of interest to the Ministry because it plays a role in farmers' understanding of the likelihood of an upcoming water scarcity.



Looking at differentials in knowledge about national water issues by region, the findings indicate similarity for some items and dissimilarity for others. The level of recognizing that Egypt would face a serious scarcity of water in future is higher among farmers in Delta compared to farmers in Upper Egypt, Middle Egypt and farmers from groundwater areas. The difference in this respect ranges from 8 percent in Middle Egypt to 41 percent in West Delta. Farmers in Upper Egypt, Middle Egypt and groundwater areas are more likely than farmers in Delta area to realize that Egypt has a fixed amount of water.

The findings indicate that education plays a significant role in every “knowledge” question. Table 5-2 and Figure 5-1 present the percentage distribution, by education level, of farmers’ knowledge of various aspects of the water situation in Egypt. One of the main effects of increasing education is to reduce the proportion of “don’t know” responses.

The proportion of uneducated farmers who identified Touthka as an agricultural project is around 30 percentage points less than the proportion of farmers with secondary or higher education. This is interesting, because most farmers have probably heard about this project on television, suggesting that television coverage may have been more effective in reaching better educated farmers or that they get information from print materials.

Education makes a significant difference to knowledge of the number of countries sharing the Nile, but even among those who are able to suggest a specific number, the vast majority did not know the correct number of countries. The mean number of countries cited by the farmers having secondary or higher education is almost double the mean number cited by farmers with no education (7 vs. 4). The findings also indicate that the more educated the farmer, the more knowledgeable he is about the fact that Egypt cannot negotiate a higher quota of Nile’s water.

What do the best-educated respondents conclude from their knowledge of the following four key facts?

1. 100 percent know that the main source of water is the Nile.
2. 100 percent know of a big agricultural project.
3. 85 percent know that the amount of water available is fixed.
4. 74 percent know that Egypt may face a scarcity of water in the future.

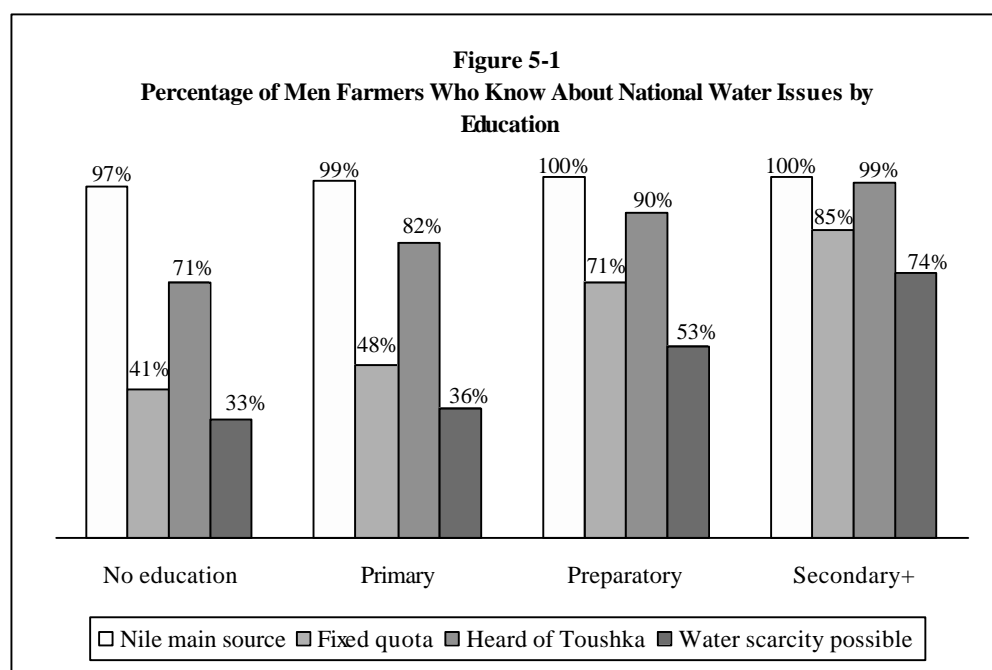
**Recommendation:** Continue to inform farmers about El Salam Canal, the likelihood of water scarcity in the future, the number of countries who share the Nile, the fixed nature of Egypt's water allocation, and that Egypt would probably not be able to negotiate a higher water allocation.

**Recommendation:** Pretest all materials among both men and women farmers to ensure that women farmers understand the messages as well as men farmers.

**Recommendation:** As a means to improve services and overall system efficiency, management transfer and privatization need to feature prominently in all messages to farmers.

**Table 5-2 Farmers' Knowledge About Water Situation in Egypt by Education**  
Percent distribution of men farmers' knowledge about water situation in Egypt by education, National Survey 2001.

Variable & Category	Men				Total
	Education				
	No Education	Primary	Prep.	Sec. or Higher	
Main Source of Water in Egypt					
Nile	97.3	98.9	100.0	99.8	98.2
Other answer	2.7	1.1	0.0	0.2	1.8
Which Sector Consumes Most Water					
Households	1.5	0.8	0.9	0.6	1.2
Industry	0.3	0.3	0.0	0.4	0.3
Agriculture	96.8	98.4	99.1	98.7	97.6
Don't know	1.4	0.5	0.0	0.2	0.9
Ever Heard of Irrigation Projects: (MR)					
Toushka	70.6	81.9	89.9	98.5	79.0
El Salam Canal	19.8	23.8	45.0	70.3	32.0
East El Ewaynat	10.8	11.2	13.8	49.7	19.0
Other	0.2	0.0	0.0	0.9	0.3
Don't know	22.7	11.8	6.4	0.4	15.6
Scarcity of Water in Future					
Serious	17.2	14.2	21.1	35.1	20.6
Not serious	15.6	21.9	32.1	38.5	22.1
No problem	45.0	38.4	29.4	19.8	38.0
Don't know	22.2	25.5	17.4	6.7	19.3
Number of Farmers	1328	365	109	465	2267
Number of Countries Sharing the Nile with Egypt					
<9	57.2	72.5	83.3	63.4	62.3
9	0.5	1.7	0.9	19.2	4.6
10	0.8	1.1	1.9	13.4	3.5
11+	0.2	0.6	0.0	0.2	0.2
Don't know	41.4	24.2	13.9	3.9	29.4
Mean (Among Valid Responses)	3.8	4.5	4.7	7.1	4.9
Amount of Water for Egypt					
Fixed quota	41.4	47.9	70.6	85.3	53.0
Variable quota	39.0	35.7	19.3	13.8	32.3
Don't know	19.6	16.3	10.1	0.9	14.7
Can Egypt Negotiate Higher Quota of Water					
Yes	63.7	59.3	55.0	50.0	59.7
No	7.3	14.7	29.4	43.5	17.1
Don't know	29.0	26.0	15.6	6.5	223.1
Number of Farmers	1292	361	109	464	2225



## 5.2 KNOWLEDGE ABOUT IRRIGATION

To assess level of knowledge about irrigation, farmers were asked a series of questions concerning Water User Associations, reducing water consumption, night irrigation and land leveling. Tables 5-3 and 5-4 present the percentage distribution of farmers by their knowledge of irrigation: the first table by region and sex and the second by education.

### 5.2.1 Water User Associations

Water User Associations (WUAs) are being formed at the *mesqa* and branch canal level through the MWRI's Irrigation Improvement Project and through the APRP/EPIQ Water Policy Reform and Netherlands Water Board Projects. Following are indicators of how these efforts have expanded since 1998:

- Number of WUAs at any stage of formation increased from 2,802 in 1998 to 3,904 in 2001.
- At the branch canal level: one branch federation in 1998 compared to 6 branch canal associations plus 8 water boards in 2001.
- Area encompassed by IIP increased from 130,000 feddans in 1998 to 278,990 feddans in 2001.
- Proportion of 7.5 million feddans of arable land encompassed by IIP: 1.7 percent in 1998 compared to 3.7 percent in 2001.

None of the *mesqas* in the sample frame had a WUA on it.

The findings indicate that farmers' awareness of WUAs continues to be low (6 percent of men farmers, and around one percent of women farmers). Farmers in groundwater areas are more knowledgeable about WUAs than farmers in other areas (57 percent). As expected, the findings also indicate that better-educated farmers are more likely to have heard about WUAs than farmers with less or no education (see Table 5-4).

In the two PRA villages that were in IIP areas, most men and women farmers were not aware of WUAs that had been formed in their vicinity, although some better-educated participants had heard of them. Most did not know anyone who was a board member, and they did not know the selection criteria for the head of the WUA. Most were not aware of WUA meetings.

### 5.2.2 Reducing Water Consumption

When farmers were asked whether they have any idea how to use less water in irrigation, around 64 percent of men farmers and 31 percent of women farmers had ideas about how to irrigate with less water. Irrigating by night was suggested by substantial percentages of farmers (41 percent) followed by leveling the land and irrigating one part at a time (36 percent and 34 percent respectively) Table 5-3 also shows distinct differences in knowledge about ways to reduce water use by region and sex. Farmers in West Delta are more knowledgeable than farmers from other areas how to use less water. Farmers from groundwater areas and East Delta were the most likely to mention night irrigation as a way to use less water. Table 5-4 indicates that more educated farmers are more likely to know how to use less water.

**Table 5-3 Farmer's Knowledge About Irrigation Situation in Egypt by Region and Sex**

Percent distribution of farmers' knowledge about irrigation situation in Egypt by region and sex, National Survey 2001.

Variable & Category	Men						Ground water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Ever Heard of a Water Users Association	0.0	0.7	20.8	2.0	1.9	5.7	56.8	0.7
Know at Least One Way to Use Less Water	95.3	42.8	66.7	74.6	49.1	63.8	35.5	30.8
<i>Among those who know how to use less water</i>								
How Exactly Might They Use Less Water (MR)								
Irrigation at night	24.2	32.1	61.5	36.0	53.0	41.3	68.6	29.1
Irrigation field one part at a time	40.6	44.0	6.0	50.5	44.3	35.8	53.9	48.8
Leveling land	14.6	42.5	45.5	36.0	31.9	33.9	81.4	17.4
Using spray or drop irrigation	33.5	13.0	37.2	40.9	35.7	33.3	7.8	15.1
Cultivating on furrow	28.1	31.6	24.6	33.0	13.5	26.8	22.5	14.0
Cleaning interior <i>mesqa</i>	1.1	13.0	15.0	7.3	4.3	8.2	3.9	4.7
Other	2.5	8.3	5.6	0.3	0.5	3.3	0.0	3.5
Advantages of Night Irrigation (MR)								
Land is cold/ plants don't fall down	67.1	64.5	64.5	74.4	53.3	64.8	48.8	55.2
The required water at night is less	16.6	39.9	54.5	49.0	31.3	40.0	0.0	32.6
Decreased evaporation	9.8	12.2	30.6	25.4	17.8	19.8	33.8	5.7
Doesn't cause problems with other farmers	0.7	15.5	9.1	23.6	18.3	14.0	0.7	3.9
No advantages	15.6	14.4	5.5	2.0	17.5	10.6	31.7	15.8
The Problems of Night Irrigation (MR)								
No problem	71.9	45.9	53.4	56.4	29.4	50.5	14.6	43.4
Can't sleep well	14.6	24.8	31.0	11.3	32.1	23.3	25.1	15.8
Inability to see water	7.5	24.4	18.6	20.0	36.6	22.0	23.0	16.5
Humidity	0.7	17.1	14.2	19.7	22.5	15.6	71.4	11.1
Lack of workers	6.8	15.3	4.7	11.8	18.0	11.4	1.0	21.1
Fear of miscreants and thieves	0.0	8.6	1.3	5.4	1.9	3.7	44.3	11.1
Other farmers steal water	2.7	4.7	3.1	0.2	0.0	2.2	1.0	2.5
Number of Farmers	295	451	451	406	377	1980	287	279

Table 5-4 Farmers' Knowledge About Irrigation Situation in Egypt by Education					
Percent distribution of men farmers' knowledge about irrigation situation in Egypt by education, National Survey 2001.					
Variable & Category	Men				Total
	Education				
	No Education	Primary	Prep.	Sec. or Higher	
Ever Heard of a Water Users Association	8.1	6.3	10.1	28.8	12.1
Know How to Use Less Water	54.1	56.2	64.2	80.0	60.2
Among those who know how to use less water					
How Might They Use Less Water (MR)					
Irrigation at night	39.8	43.4	35.7	51.6	43.4
Leveling land	31.2	44.4	48.6	43.5	37.4
Irrigating the field one part at a time	42.8	32.7	22.9	31.5	37.1
Using spray or drop irrigation	22.0	23.9	32.9	53.5	31.4
Cultivating on furrow	28.0	28.3	20.0	23.9	26.5
Cleaning interior <i>mesqa</i>	7.0	10.2	10.0	7.8	7.8
Other	4.3	2.0	4.3	1.1	3.1
Advantages of Night Irrigation (MR)					
Land is cold/ plants don't fall down	60.3	65.8	66.1	66.7	62.8
The required water at night is less	31.8	47.4	33.0	34.6	34.9
Decreased evaporation	17.8	19.2	11.0	36.6	21.6
No advantages	15.7	9.0	11.0	10.1	13.3
Fewer problems with other farmers	11.0	14.5	23.9	11.8	12.4
Problems of Night Irrigation (MR)					
No problem	47.6	47.7	50.5	38.9	46.0
Can't sleep well	24.5	21.9	19.3	23.0	23.6
Humidity	20.4	23.3	17.4	29.7	22.6
Inability to see water	20.0	23.8	25.7	25.8	22.1
Lack of workers	10.0	11.0	8.3	10.1	10.1
Fear of miscreants and thieves	6.3	9.0	8.3	16.3	8.9
Other farmers steal water	2.1	2.5	1.8	1.7	2.1
Number of Farmers	1328	365	109	465	2267

### 5.2.3 Night Irrigation

When farmers were asked about the advantages of irrigating at night, approximately one third of men and women farmers (40 and 33 percent respectively) mentioned that less water was required for night irrigation. Considering the proportion of respondents who mentioned either reduced water requirement or reduced evaporation, the proportion reaches 52 percent (not shown in table)<sup>4</sup>. There were significant regional differences in the percentage of farmers who found an advantage in irrigating by night, ranging from 68 percent in groundwater areas to 98 percent in Middle Egypt. The findings also suggest that there are actually different levels of benefit to night irrigation by region. Around two-third of farmers mentioned the coldness of land by night/plants not falling down as an advantage. The proportion of farmers who mentioned this advantage ranges from around half of farmers in groundwater areas to 74 percent in Middle Egypt.

Minor differences exist by level of education, suggesting that this knowledge is gained in practice by all farmers, regardless of their level of education.

<sup>4</sup> This percentage is reached by adding the two percentages in the Table, then subtracting those cases who cited both advantages to avoid double-counting them.

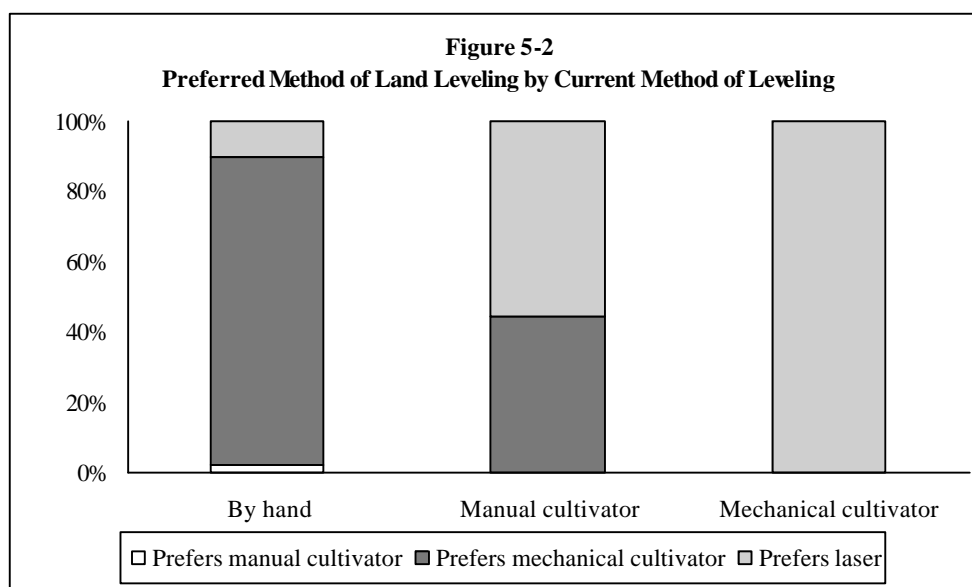
When farmers were asked about the disadvantages of irrigating at night, 51 percent of men farmers and 43 percent of women farmers said there were no problems. Farmers from West Delta are less likely than other farmers to find a problem in irrigating at night. There were only three main disadvantages for most farmers; the inability to see water at night, interrupting sleep, and humidity. For men farmers, each of three problems was mentioned by around one-fifth of farmers. As for women farmers, the leading problem was the lack of workers at night (21 percent). Table 5-4 suggests that better-educated men farmers found night irrigation more problematic than less-educated farmers.

#### 5.2.4 Land Leveling

Farmers were asked about method of land leveling because one way to increase the efficiency of irrigation is to use improved methods of land leveling. Virtually every farmer levels his or her land, using any combination of four means: by hand, by manual cultivator, by mechanical cultivator, or by laser (Table 7-1). Some farmers use more than one method of land leveling,

while others use only one method. A total of 732 men farmers who currently use one method said that another method would increase productivity, and cited only one preferred method<sup>5</sup>. Table 5-5 shows that farmers are aware of leveling methods that would increase their productivity, including the laser. Most farmers who currently level by hand would prefer to level by mechanical cultivator; just over half of farmers who currently use a manual cultivator would prefer the laser, and every farmer who now uses a mechanical cultivator and who cited one method to improve his productivity cited the laser.

<b>Table 5-5 Farmer's Knowledge About Land Leveling</b>			
Current and preferred methods of land leveling among men farmers who level with one method and who know of one method that would improve their productivity, National Survey 2001.			
Variable & Category	Current Method of Land Leveling		
	By hand	Manual cultivator	Mechanical cultivator
<b>Preferred Method of Land Leveling</b>			
Manual cultivator	2.0	0.0	0.0
Mechanical cultivator	87.8	44.3	0.0
Laser	10.2	55.7	100.0
<b>Number of Farmers</b>	<b>49</b>	<b>131</b>	<b>551</b>



<sup>5</sup> The number of women farmers who met these criteria were only 43, so there responses are not cross-tabulated here.

**Recommendation:** Inform farmers about the advantages of private sector management over their water resources, and the benefits of flexibility that come as a result.

**Recommendation:** Inform farmers about WUAs that are being formed, about ways to use less water for irrigation, laser land leveling, and the advantages of night irrigation.

### 5.3 KNOWLEDGE OF RICE POLICY

The Ministry is interested in measuring farmers' knowledge of Ministry policies to verify how well farmers understand important policies which the Ministry has implemented and communicated to them through mass media campaigns, district engineers and other means in order to reduce water use in irrigation. The main policy investigated in this survey is the rice policy. Note that rice is not grown in Upper Egypt.

As Table 5-6 shows, 82 percent of men farmers and about half of women farmers know why the Ministry limits rice cultivation. Reflecting regional differences in the cropping pattern, there are substantial differences in knowledge at the regional level: farmers in Upper Egypt are much less knowledgeable on this point than those in the Delta, although there are still differences within the Delta. Almost all of those who said they knew the reason did know the correct reason (it takes a lot of water) with minor differentials by region. Farmers with secondary or higher education are significantly more knowledgeable on this (94 percent) than farmers with no education (78 percent), as shown in Table 5-6.

Table 5-6 Farmers' Knowledge About Cultivating Rice by Region and Sex								
Percent distribution of farmers' knowledge about cultivating rice by region and sex, National Survey 2001.								
Variable & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Know Why the Ministry Limits Rice Cultivation	93.9	90.9	96.0	78.6	47.7	81.8	88.9	53.4
Among those who know the reason								
What is the Reason (MR)								
High water requirement	100.0	99.3	97.5	94.0	93.3	97.2	99.2	96.6
Raises water table	0.0	4.6	2.1	2.5	2.2	2.5	2.7	0.7
Decreases water salinity	5.1	4.1	10.6	0.3	1.1	4.9	0.0	2.7
Other	0.0	2.2	1.8	10.7	6.1	3.8	0.0	4.0
Know that Rice is a Crop Which Consumes a Lot of Water	97.3	100.0	99.8	98.3	70.8	93.6	98.3	90.3
Number of Farmers	295	451	451	406	377	1980	287	279
Among those who have ever grown rice								
Heard of a Short Duration Variety of Rice	92.6	88.1	94.9	0.0	--	92.7	1.6	81.5
Number of Farmers	189	143	429	3	0	764	225	108

Respondents were asked whether they knew which crops had high water requirements. Overall, more than 90 percent of men and women farmers knew that rice requires more of water than other crops, with minor regional variations except in Upper Egypt.

Farmers were asked whether they had heard of a short duration variety of rice<sup>6</sup>. Among rice farmers (i.e. farmers who were currently growing or had ever grown rice), 93 percent of men and 82 percent of women had ever heard of such a variety. The findings indicate some minor differentials within the Delta, from 88 percent in Middle Delta to 95 percent in East Delta. Respondents were asked for the name of one such variety of rice, and about 45 percent of all rice farmers were able to give the correct name of one such variety, again with significant regional variation. Almost all Middle Delta rice farmers who said they knew of such a variety were able to give a correct name. Higher education shows an increase in the proportion who had heard of a short duration variety, but the pattern was not as clear with giving the correct name of such a variety (Table 5-7).

Table 5-7 Farmers' Knowledge About Cultivating Rice by Education					
Percent distribution of farmers' knowledge about cultivating rice by education, National Survey 2001.					
Variable & Category	Men				Total
	Education				
	No Education	Primary	Prep.	Sec. or Higher	
Know Why the Ministry Limits Rice Cultivation	78.0	84.1	85.3	94.2	82.7
Among those who know the reason					
What is the Reason (MR)					
High water required	97.0	97.1	98.9	98.6	97.5
Raises water table	2.5	1.3	0.0	3.9	2.5
Decreases water salinity	4.4	3.3	5.4	4.3	4.3
Other					
Know that Rice is a Crop Which Consumes a Lot of Water	92.7	97.3	96.3	95.7	94.2
Number of Farmers	1328	365	109	465	2267
Among those who have ever grown rice					
Heard of a short duration variety of rice	76.7	75.4	85.0	54.1	71.9
Number of Farmers	601	130	40	218	989

#### 5.4 CHANGE IN KNOWLEDGE

To assess the change in the level of farmers' knowledge concerning water and irrigation issues, 1998 results are compared to 2001 results for men and women (Table 5-8).

Knowledge of national water issues has increased significantly on five of seven indicators. It also increased on a sixth indicator, knowledge of the ten countries share the Nile, but the change is not programmatically significant.

The percentage of men farmers who knew that Nile is the main source of water in Egypt increased by 20 percentage points (78 percent vs. 98 percent), and the increase is even higher among women farmers: 85 percent in 2001 compared to 38 percent in 1998. The proportion who know that Egypt could suffer from a lack of water in the future has also increased, but remains below half of farmers.

Knowledge of the Ministry's national irrigation projects has improved significantly. In 2001, 78 percent of men and 39 percent of women had heard of Tushka, compared to 54 percent and 14 percent respectively in 1998. The proportion of men who had heard of the El Salam Canal also increased significantly, but it remains less well known than Tushka, although Tushka is under construction and the Salam Canal is operational.

<sup>6</sup> Short duration varieties mature in less than the 160 days required by long duration varieties, as follows:

Giza 4000/177	120-125 days	Giza 178	130-135 days
Sakha 102	120 days	Sakha 101	140 days



The proportion of farmers who know that Egypt cannot negotiate a higher quota of water has increased significantly, while the proportion of farmers who know that the amount of water available to Egypt is fixed has dropped significantly.

Knowledge of two of three on-farm water management knowledge indicators has increased significantly. The proportion of farmers who can cite at least one way to use less water rose from 20 percent of men farmers to 64 percent, and among women farmers from 4 percent to 31 percent. The proportion of men farmers who have heard of Water User Associations also increased significantly, from 3 percent to 6 percent. The rate has risen as the Irrigation Improvement Project has expanded and pilot efforts at branch canal association have been introduced.

The proportion of men who know that night irrigation is more efficient due to fewer losses to evaporation was unchanged, and among women farmers, the proportion who knew this decreased.

Knowledge of the Ministry's rice policy has also improved significantly: the knowledge that rice consumes more water than other crops, and that its cultivation is restricted by law due to its high water requirements. Among farmers who have ever grown rice, virtually everyone has heard of short-duration rice, and the proportion who can correctly name one such variety has risen significantly, to three-quarters of both men and women farmers.

<b>Table 5-8 Comparison of Levels of Knowledge About Water Issues and Irrigation Practices Between 1998 and 2001 by Sex</b>				
Percentage distribution of farmers by knowledge about water issues by sex, between 1998 and 2001, National Survey 2001.				
Knowledge indicator	Men		Women	
	1998	2001	1998	2001
<b>National Water Issues</b>				
Nile is the main source of water	78.1	<b>98.2</b>	37.8	<b>84.6</b>
Know that ten countries share the Nile	1.6	<b>3.0</b>	0.5	0.7
Amount of Nile water for Egypt is fixed	47.7	51.3	29.9	<b>18.6</b>
Egypt cannot negotiate higher quota of water	8.2	<b>15.4</b>	32.5	42.8
Egypt might face a water scarcity	33.3	<b>42.7</b>	10.1	<b>19.0</b>
Ever heard of Toushka	54.2	<b>77.8</b>	14.4	<b>39.4</b>
Ever heard of El Salam Canal	15.3	<b>31.3</b>	2.7	5.4
<b>On-Farm Water Management</b>				
Heard of Water Users Associations	2.7	<b>5.7</b>	0.5	0.7
Know that night irrigation takes less water	57.4	53.7	51.0	<b>37.6</b>
Know at least one way to use less water	20.2	<b>63.8</b>	4.3	<b>30.8</b>
<b>Rice Policy</b>				
Know that rice consumes more water than other crops	66.7	<b>93.6</b>	69.7	<b>90.3</b>
Know that the ministry limits rice cultivation because of its high water requirements	57.3	<b>80.4</b>	31.4	<b>51.6</b>
<b>Number of Farmers</b>	<b>1910</b>	<b>1980</b>	<b>188</b>	<b>279</b>
<i>Among farmers who have ever grown rice</i>				
Heard of short-duration rice	62.7	<b>92.7</b>	58.7	<b>82.2</b>
Can name one variety of short-duration rice	45.4	<b>77.0</b>	45.7	<b>74.1</b>
<b>Number of Farmers</b>	<b>856</b>	<b>989</b>	<b>92</b>	<b>108</b>
2001 figures in <b>bold</b> are significantly different from 1998 figure at $p < 0.01$ .				



## ATTITUDES TOWARD WATER RESOURCES

## 6

A positive attitude toward water conservation is a prerequisite to modifying patterns of water use. Measuring attitudes is always difficult, whether directly or indirectly. This chapter looks at attitudes toward the Ministry, cost recovery and Water User Associations as well as attitudes toward having a role in water management. Regional and educational differentials, and changes in attitudes between 1998 and 2001 are also discussed.

### 6.1 ATTITUDES

#### 6.1.1 Attitudes Toward the Ministry

Table 6-1 looks at respondents' concerns about irrigation and views of the Ministry. When farmers were asked what was their greatest concern about irrigation in the future, more than half of men farmers (58 percent) and 55 percent of women farmers were most concerned about the availability of water. Groundwater farmers' most pressing concern was the possibility of drought. A second concern was that the water supply be sufficient and clean, which was expressed by 43 percent of men farmers and 42 percent of women farmers. All other issues were mentioned by small proportions of men and women farmers. Regionally, the concerns were significantly different. East Delta and Middle Egypt were concerned about the availability of water more than other regions, while Middle Delta was most concerned by the sufficiency and the cleanliness of water.

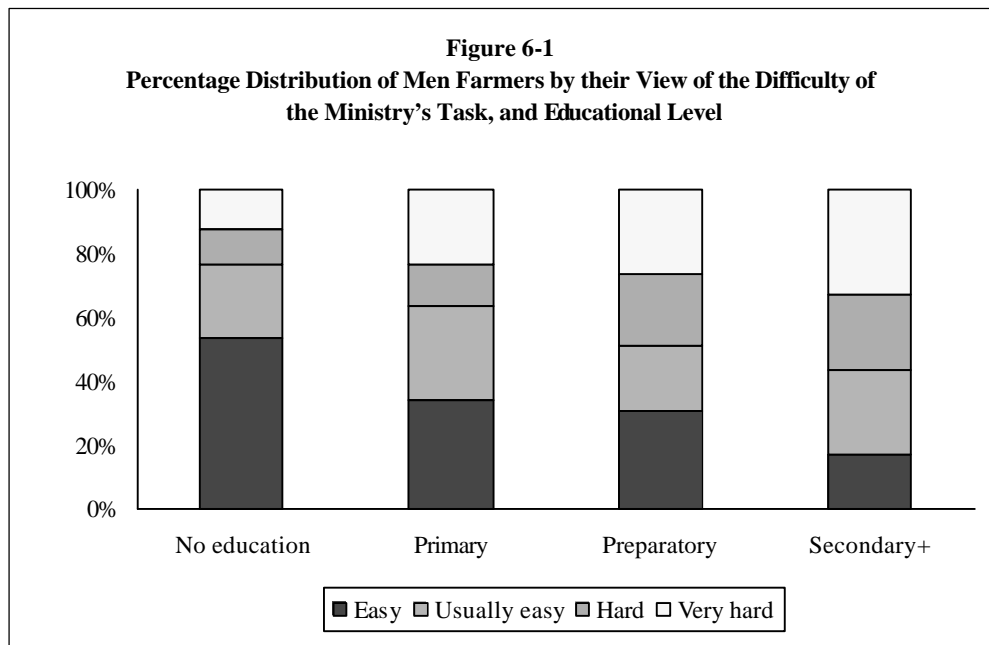
Table 6-1 Farmers' Attitudes Toward Ministry by Region and Sex								
Percent distribution of farmers' attitudes toward ministry by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Greatest Concern for the Future of Irrigation (MR)								
Water doesn't arrive	44.4	60.5	67.8	67.0	42.4	57.7	9.4	54.5
Availability of enough clean water	41.4	61.6	39.0	40.4	31.3	43.3	19.9	41.9
Cost of irrigation water	10.2	11.5	9.8	10.3	12.5	10.9	0	8.6
Salinity of irrigation water	7.8	12.2	20.4	1.5	0.8	9.0	2.8	3.9
Drought	1.7	3.8	4.0	11.6	10.3	6.4	38.3	2.2
Low levels at the High Dam	1.4	4.7	0.9	10.1	10.6	5.6	1.7	1.4
Covering the canal	2.7	6.0	4.2	1.0	0.5	3.0	0	2.9
Using drainage water	1.4	2.9	3.1	2.0	0.5	2.1	0.0	0.4
Other	5.8	6.2	14.9	6.9	21.5	11.2	34.8	12.2
Does the Ministry Have an Easy Job Providing Water to Farmers?								
Easy	43.1	33.7	42.8	34.0	56.6	41.6	39.0	61.6
Usually easy, sometimes hard	26.4	34.6	25.7	20.2	19.1	25.5	15.0	16.1
Hard and complicated	16.3	8.6	11.1	27.3	13.6	15.1	10.8	6.1
Very hard	13.6	21.1	18.4	17.7	9.8	16.5	33.1	14.3
Impossible to satisfy everyone	0.7	2.0	2.0	0.7	0.8	1.3	2.1	1.8
Could the Ministry Do a Better Job of Water Delivery?								
Yes	99.3	95.3	81.6	87.9	73.1	87.1	8.7	84.2
No	0.7	4.7	18.4	12.1	26.9	12.9	5.2	15.4
Groundwater	--	--	--	--	--	--	86.1	0.4
Number of Farmers	295	451	451	406	377	1980	287	279

When asked how easy they thought the Ministry's job is in providing water to farmers, it was found that the majority of farmers said they felt the Ministry has an easy job (42 percent of men farmers and 62 percent of women farmers), while about 17 percent of men farmers and 14 percent of women farmers said it was very hard. Table 6-1 indicates that there are no great differences between regions, except for farmers in groundwater areas, one-third of whom acknowledged that the Ministry has a very hard job. Finally, as a measure of customer satisfaction, farmers were asked whether they thought the Ministry could do a better job of water delivery. Table 6-1 indicates that most farmers said yes (87 percent of men farmers and 84 percent of women farmers).

Looking at attitudes at different education levels, Table 6-2 indicates that farmers with primary school are more concerned about the availability, sufficiency and cleanliness of water than other farmers, while uneducated farmers are more concerned by the salinity and the cost of irrigation water than better educated farmers. It is interesting to know that better educated farmers were more sympathetic toward the Ministry: they were the most likely to feel that the Ministry has a difficult job, as illustrated in Figure 6-1. Table 6-2 indicates that most farmers irrespective of their education thought that the Ministry could do a better job of water delivery.

**Recommendation:** Convince farmers how difficult it is to bring the right amount of water from Lake Nasser to each farmer, and convince farmers that the Ministry is working hard to do so.

Table 6-2 Farmers' Attitudes Toward Ministry by Education					
Percent distribution of men farmers' attitudes toward ministry by education, National Survey 2001.					
Variables & Category	Men				Total
	Education				
	No Education	Primary	Prep.	Sec. Or Higher	
Greatest Concern for the Future of Irrigation (MR)					
Water doesn't arrive	48.3	62.5	56.9	51.0	51.6
Availability of enough clean water	39.6	49.6	49.5	33.1	40.4
Drought	5.4	6.3	5.5	29.0	10.4
Cost of irrigation water	10.7	7.9	8.3	7.5	9.5
Salinity of irrigation water	10.1	5.5	8.3	5.2	8.2
Low levels at the High Dam	2.0	4.4	5.5	14.2	5.1
Covering the canal	2.6	1.4	4.6	3.2	2.6
Using drainage water	1.3	1.9	1.8	3.2	1.8
Other	18.0	8.8	11.9	8.0	14.2
Does the Ministry have an Easy Job Providing Water to Farmers?					
Easy		34.0	30.3	16.6	41.3
Usually easy, sometimes hard	22.5	29.0	21.1	25.8	24.1
Hard and complicated	11.4	12.9	22.0	23.2	14.6
Very hard	12.1	23.0	26.6	31.8	18.6
Impossible to satisfy everyone	1.2	1.1	0	2.6	1.4
Could the Ministry Do a Better Job of Water Delivery?					
Yes	75.6	85.4	84.3	73.3	77.1
No	12.8	9.3	13.9	11.2	12.0
Groundwater	11.6	5.2	1.9	15.5	10.9
Number of Farmers	1328	365	109	465	2267



### 6.1.2 Attitudes Toward Cost Recovery

Farmers were asked if they are generally willing to share in the costs of upgrading the irrigation system to provide continuous flow and to upgrade the drainage system. Tables 6-3 and 6-4 present the percentage distribution of farmers' attitudes towards cost recovery by region and education respectively. The data indicates that there is a high level of willingness among men farmers than women farmers to share in the costs of improving both the irrigation and drainage systems as shown in the tables.

**Recommendation:** MWRI to redevelop materials on changing farmers attitudes toward cost sharing and cost-recovery.

Overall, 85 percent of men farmers are willing to share in the costs of upgrading the irrigation system to provide continuous flow, and 83 percent of men farmers are willing to share in the costs of upgrading the drainage system. In comparison, around two-thirds of women farmers are willing to share in these costs, possibly due to the fact that most women farmers have fewer assets than men farmers.

Table 6-3 Farmers' Attitudes Towards Cost Recovery by Region								
Percent distribution of farmers' attitudes toward cost recovery by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Proportion Willing to Share in the Costs of								
Upgrading the irrigation system to provide continuous flow	99.3	85.4	84.7	92.6	65.5	85.0	60.3	67.7
Upgrading the drainage system	84.1	81.4	83.8	90.1	73.7	82.7	60.3	65.9
Number of Farmers	295	451	451	405	377	1980	287	279

There are significant regional differences among men as shown in Table 6-3. Farmers in Upper Egypt and those who use the groundwater are significantly less willing to share in these costs, possibly because they experience fewer problems, while West Delta and Middle Egypt have the highest proportions willing to share in these costs. Regarding educational differences among

farmers in Table 6-4, better-educated farmers are significantly more willing to share in these costs than less-educated farmers.

Table 6-4 Farmers' Attitudes Towards Cost Recovery By Education					
Percent distribution of male farmers' attitudes toward cost recovery by education, National survey 2001.					
Variables & Category	Men				Total
	Education				
	No Education	Primary	Prep.	Sec. Or Higher	
Proportion Willing to Share in the Costs of					
Upgrading the irrigation system to provide continuous flow	80.3	82.2	87.2	84.7	81.9
Upgrading the drainage system	79.2	79.7	85.3	80.4	79.8
Number of Farmers	1328	365	109	465	2267

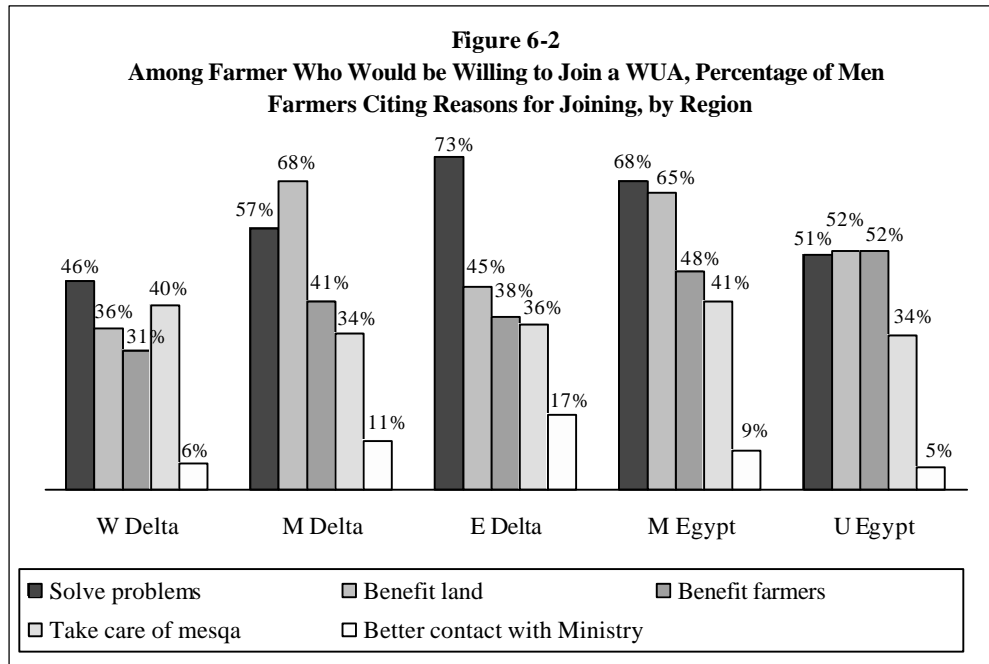
### 6.1.3 Attitudes Toward Water User Associations

As discussed in Chapter 5, only 6 percent of farmers have ever heard of Water User Associations. For those who had not heard of WUAs, the interviewer explained to them what it is and its role in water management on the *mesqa*. Then a series of questions was asked including their attitudes toward joining such an association. The results of these questions are presented in Tables 6-5 and 6-6.

Table 6-5 shows that around three-quarters of men farmers said they would join a WUA if one were formed near them, compared with less than a quarter of women farmers. The most positive attitudes toward WUAs were observed in Middle Egypt (89 percent) and the lowest level in Upper Egypt (58 percent).

Table 6-5 Water User Association								
Percent distribution of farmers by attitude toward Water User Association by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
<b>Would Join if an Association Were Nearby</b>								
Yes	63.1	80.7	77.4	89.4	57.8	74.7	63.8	24.0
No	36.9	19.3	22.6	10.6	42.2	25.3	36.2	76.0
<i>Among those who said they would join</i>								
<b>Reasons for Joining (MR)</b>								
Solve water problems	45.7	57.4	72.8	67.5	51.4	61.1	18.0	41.8
Benefit of land	35.5	67.6	44.7	65.0	52.3	55.3	81.4	55.2
Benefit of farmer/farmers	30.6	41.2	38.1	47.9	52.3	42.4	75.4	44.8
Take care of <i>mesqa</i>	40.3	34.1	36.4	41.3	33.9	37.2	61.7	20.9
Complaints reach ministry staff	5.9	10.7	16.6	8.5	5.0	10.1	16.4	4.5
Get information about irrigation	2.2	2.2	2.9	0.8	0.5	1.8	8.2	1.5
Other	7.0	2.2	3.7	0.6	0.5	2.5	0.0	3.0
<i>Among those who said they would participate</i>								
<b>Would Participate in (MR)</b>								
Resolving conflicts between farmers	100	96.2	96.6	97.5	97.2	97.2	98.9	44.8
Sharing cost of <i>mesqa</i> maintenance	99.5	94.2	95.1	94.8	88.5	94.4	65.0	76.1
Electing representatives	95.2	77.5	94.6	91.2	93.6	89.5	98.4	68.7
Planning improvements with the engineer	82.3	70.9	88.8	80.7	65.1	78.1	83.1	28.4
Setting regulations for the association	79.6	65.4	88.8	66.4	56.4	71.6	90.7	26.9
<b>Number of Farmers</b>	<b>295</b>	<b>451</b>	<b>451</b>	<b>406</b>	<b>377</b>	<b>1980</b>	<b>287</b>	<b>279</b>

Among those who were interested in joining, the leading reasons cited were the opportunity to solve water problems (61 percent), benefits that would accrue to the land (55 percent) and to the farmer (42 percent). Figure 6-2 illustrates regional differences in reason for joining a WUA. Although the same reasons were cited in each region, the order was different: for example, in Upper Egypt, 52 percent of farmers felt that the association would benefit the farmer, compared to 31 percent of farmers in West Delta and 75 percent in areas with groundwater. Also, 68 percent of farmers in Middle Delta mentioned benefit of land as the reason for joining the association compared with 36 percent in West Delta.



Clear differences toward Water User Associations exist by education level, as shown in Table 6-6. Better-educated farmers are substantially more interested in joining a WUA than less-educated farmers. Reason for joining a WUA also differs by educational level, but the differences by educational level are not as striking as the regional differences. Around 61 percent of farmers with secondary education or higher mentioned the benefit of the land as the main reason for joining WUA if it will be formed, compared to 56 percent among farmers with no education.

As Table 6-5 shows, women farmers cited the same main reasons for joining, although in different proportions. Only 45 and 55 percent of women farmers cited the benefits that would accrue to farmers and to the land respectively, whereas 42 percent cited the opportunity to solve water problems.

There was a high degree of interest among farmers for participating in specific tasks within the WUA, ranging from 97 percent of potential men members being willing to participate in solving conflicts between farmers to 74 percent of these respondents being willing to share in setting up association regulations. There was also a high degree of willingness to share in the costs of *mesqa* repair and maintenance (91 percent).

As Tables 6-5 and 6-6 show, there are also regional and educational differentials. For some tasks, differentials are striking, however for other tasks there are no significant differences. There are clear differences between the responses of farmers from areas using groundwater and farmers from the Nile valley. As shown in Table 6-5, "setting regulations for the association" was mentioned by only 56 percent of farmers in Upper Egypt compared with 91 percent among farmers in areas using groundwater, however, there is no significant difference in reporting

resolving conflicts between farmers: all farmers want to participate in conflict resolution through the WUA.

Differentials are smaller by education, which is shown in Table 6-6. Sixty-eight percent of uneducated farmers reported that they would participate in setting internal regulations for the association, compared with 88 percent among highly educated farmers.

<b>Table 6-6 Farmers' Attitudes Toward Water User Association by Education</b> Percent distribution of men farmers' attitudes toward Water User Association by education, National Survey 2001.					
Variables & Category	Men				Total
	Education				
	No Education	Primary	Prep.	Sec. Or Higher	
<b>Would Join if an Association Were Formed Nearby</b>					
Yes	67.7	80.0	81.7	82.4	73.4
No	32.3	20.0	18.3	17.6	26.6
<i>Among those who said they would join</i>					
<b>Reasons for Joining (MR)</b>					
Benefit of land	56.2	59.6	60.7	61.1	58.1
Solve water problems	54.6	62.3	59.6	55.4	56.4
Benefit of farmer/farmers	42.4	44.2	51.7	54.8	46.1
Take care of <i>mesqa</i>	37.0	41.4	38.2	45.7	39.9
Complaints reach ministry staff	8.6	9.2	9.0	17.8	10.8
Get information about irrigation	2.0	2.1	1.1	4.2	2.5
Other	3.1	1.7	0	1.0	2.2
<i>Among those who said they would participate</i>					
<b>Would Participate in (MR)</b>					
Resolving conflicts between farmers	96.9	96.2	100	99.0	97.4
Sharing cost of <i>mesqa</i> maintenance	90.7	93.2	95.5	89.8	91.2
Electing representatives	87.5	89.7	92.1	97.4	90.4
Planning improvements with the engineer	73.6	80.1	84.3	88.0	78.7
Setting regulations for the association	67.5	72.6	78.7	88.0	73.7
<b>Number of Farmers</b>	<b>1328</b>	<b>365</b>	<b>109</b>	<b>465</b>	<b>2267</b>

**Recommendation:** If the KAP survey is repeated in 2004, the Ministry may wish to take a sample of farmers on *mesqas* and *Branch canals* with WUAs, to learn more about the knowledge, attitudes, and practices of these farmers.

The PRA study provides evidence of active informal forms of cooperation which farmers use: managing a *sakia*, owning a mobile pump, undertaking investment to upgrade irrigation equipment and to install a village sewage system, and *mesqa* cleaning additional to those carried out by the agricultural cooperative.

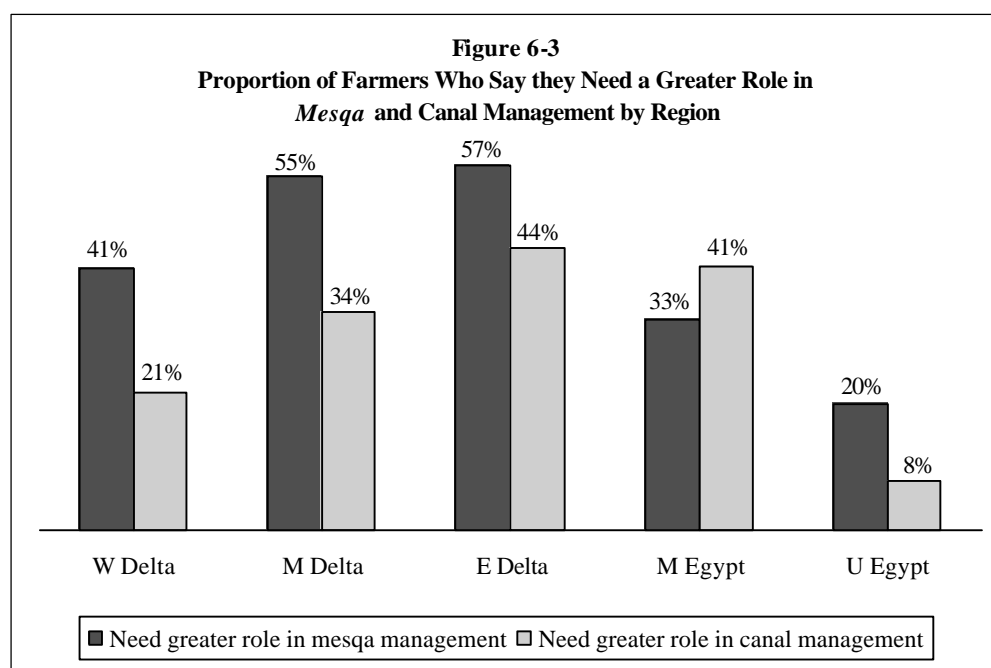
#### 6.1.4 Attitudes toward Privatization of Water Resources and Participation in Water Management

In order to understand farmers' attitudes toward participation in water management, farmers were asked whether they currently have a role in managing the *mesqa* or branch canal and if they need to have a role or a greater role in managing the *mesqa* or branch canal. Additional questions were



asked about the benefits and disadvantages in having a (greater) role in managing the *mesqa* or branch canal. The results of these questions are presented in Tables 6-7 and 6-8.

Table 6-7 Farmers' Attitudes Toward Increased Role in Water Management by Region and Sex								
Percent distribution of farmers by attitude toward enrolment in managing the <i>mesqa</i> and the branch canal by region and sex, National Survey 2001.								
Variable & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Need to Have a (Greater) Role in Managing the <i>Mesqa</i>								
Yes	40.7	55.0	56.8	32.8	19.6	42.0	9.4	5.0
No	59.3	45.0	43.2	67.2	80.4	58.0	90.6	95.0
The Benefits (MR)								
Cleaning <i>mesqa</i>	42.0	50.1	45.2	53.0	24.9	43.6	31.0	31.9
Disinfecting/covering sides of <i>mesqa</i>	24.7	32.6	46.3	26.6	13.8	29.7	22.6	15.1
Managing irrigation in turns	16.9	25.9	30.8	40.6	22.5	28.1	39.7	9.3
No benefit	29.5	16.4	11.8	24.4	43.0	24.0	27.9	50.2
Solving problems between farmers	1.7	28.8	9.5	33.7	20.2	19.7	28.2	3.2
Complaints delivery and follow up	8.8	18.6	11.8	7.6	3.4	10.5	19.9	1.8
Set fining system for throwing garbage in <i>mesqa</i>	10.2	11.1	4.2	1.5	4.2	6.1	3.8	3.9
Information about irrigation	1.4	0.2	3.3	0.2	0.0	1.1	7.3	0.4
Other	7.8	5.5	7.3	4.7	9.8	6.9	2.8	9.7
The Disadvantages (MR)								
No disadvantage	61.0	22.8	56.1	56.9	46.7	47.6	55.4	29.4
Needs effort	5.8	41.7	16.4	23.2	25.5	23.7	24.7	33.0
No time	10.8	30.6	23.3	13.5	18.6	20.2	12.9	9.7
Headache	3.7	33.3	7.8	14.5	14.9	15.7	13.2	17.9
No collaboration between farmers	15.6	11.5	5.1	12.6	5.8	9.8	1.0	7.2
Needs money	0.7	5.3	5.8	1.2	4.0	3.6	0.7	1.1
Other	4.1	3.1	4.2	1.0	1.3	2.7	0.0	29.7
Need to Have a (Greater) Role in Managing the Branch Canal								
Yes	21.4	33.9	43.9	40.9	7.7	30.8	--	2.5
No	78.6	66.1	56.1	59.1	92.3	69.2	--	97.1
No canal	--	--	--	--	--	--	100.0	0.4
The Benefits (MR)								
Increasing water in canal	28.8	35.5	41.9	41.1	10.9	32.4	--	20.4
No benefit	30.2	22.6	23.1	22.4	61.8	31.3	--	53.4
Canal disinfection	16.9	31.3	33.3	42.9	24.1	30.6	--	11.5
Cleaning canal	16.9	45.9	23.7	44.1	16.7	30.6	--	17.9
Managing rotations	8.8	16.2	22.2	11.1	7.2	13.7	--	5.4
Solve conflicts between farmers	0.7	12.9	7.8	15.8	10.9	10.1	--	3.6
Covering sides of canal	7.8	2.9	11.3	8.1	8.5	7.7	--	3.6
Covering canal	11.5	13.3	3.3	6.4	0.5	6.9	--	0.5
Canal enlargement	10.8	12.0	2.9	6.7	0.8	6.5	--	3.9
Complaints followed up by authorities	1.4	7.5	7.5	4.4	2.1	4.9	--	1.1
Getting information about irrigation	1.0	0.7	1.6	0.0	0.0	0.7	--	0.4
Other	5.4	1.8	3.3	1.0	1.1	2.4	--	5.4
The Disadvantages (MR)								
Needs effort	14.2	41.2	31.0	27.8	26.5	29.3	--	34.4
No time	18.3	36.1	27.5	16.0	17.8	23.9	--	12.5
No disadvantage	48.8	22.2	37.5	57.6	44.8	21.2	--	28.0
Headache	9.8	34.1	9.5	13.5	14.6	17.0	--	18.6
No collaboration between farmers	11.2	7.3	5.1	8.4	4.5	7.1	--	7.5
Needs money	0.3	6.0	9.8	2.2	4.2	4.9	--	3.9
Other	4.1	4.9	8.2	3.7	2.9	4.9	--	28.0
Number of Farmers	295	451	451	406	377	1980	287	275



#### **Benefits of a (greater) role in managing the mesqa**

Among men in the Nile valley, 76 percent saw a benefit. The leading benefits cited were: cleaning the *mesqa*, cleaning/covering the *mesqa*, irrigation better organized, solving problems. Among men in groundwater areas, 72 percent saw a benefit. The leading benefits cited were: irrigation better organized, cleaning the *mesqa*, solving problems, cleaning/covering the *mesqa*, and resolving complaints. Among women, 50 percent saw a benefit, and the leading benefits cited were: cleaning, and cleaning/covering the *mesqa*. Regionally, 98 percent of farmers in East Delta saw a benefit, compared to 57 percent of farmers in Upper Egypt. By educational level, 83 percent of highly educated farmers saw a benefit compared to 70 percent of uneducated farmers.

#### **Disadvantages of a (greater) role in managing the mesqa**

Among men in the Nile valley, 52 percent saw a disadvantage. The leading disadvantages cited were: it needs effort, they do not have time, and it would be a headache. Among men in groundwater areas, 45 percent saw a disadvantage. The leading disadvantages cited were: needs effort, headache, and no time. Among women, 71 percent saw a disadvantage. The leading disadvantages cited were: needs effort, and headache. Regionally, 77 percent of farmers in Middle Delta saw a disadvantage, compared to 39 percent in West Delta. By educational level, the percent of farmers identifying disadvantages is fairly consistent across educational levels, although the lack of time as a disadvantage grows with the level of education, from 13 percent of uneducated farmers to 30 percent of highly educated farmers.

#### **Benefits of a (greater) role in managing the canal**

Among men in the Nile valley, 69 percent saw a benefit. The leading benefits cited were: increasing water in canal, canal disinfection and cleaning, managing rotations and solving conflicts. Among women, 47 percent saw a benefit. The leading benefits cited were: increasing water in canal, and canal disinfection and cleaning. Regionally, around 78 percent of farmers in Middle Egypt and Middle Delta saw a benefit, compared to 37 percent of farmers in Upper Egypt. By educational level, the proportion who are able to identify a benefit increases with education, from 63 percent of uneducated farmers to 76 percent of highly educated farmers.

### **Disadvantages of a (greater) role in managing the canal**

Among men in the Nile valley, 79 percent saw a disadvantage to increase role in canal management. The leading disadvantages cited were: it needs effort, they do not have time, and it would be a headache. Among women, 72 percent saw a disadvantage. The leading disadvantages cited were: needs effort, headache, and no time. Regionally, 87 percent saw a disadvantage in Middle Delta, compared to 42 percent in Middle Egypt. By educational level, the percent of farmers identifying disadvantages is fairly consistent across educational levels, although the lack of time as a disadvantage grows with the level of education, from 18 percent of uneducated farmers to 36 percent of highly educated farmers.

Four significant findings can be drawn from this complex table:

1. Men farmers in both the Nile valley and groundwater areas are aware that there would be both advantages and disadvantages to having an increased role in water management. For *mesqa* management, they see benefits outweighing disadvantages. Farmers in East Delta appear to be the most amenable to an increased role in *mesqa* maintenance. This is illustrated in Figure 6-3.
2. The benefits all farmers anticipate from an increased role in *mesqa* management are: improved cleaning of the *mesqa*, organizing water delivery better, and resolving complaints. These benefits outweigh the disadvantages of the effort it would take.
3. Women are less likely to see benefits to an increased role in water management and more likely to see disadvantages at both the *mesqa* and canal level. Seven in ten women saw a disadvantage, while only five in ten saw a benefit.
4. For canal management, the results are more equivocal than for *mesqa* management. Benefits outweigh disadvantages in all regions except Middle Delta and Upper Egypt, but by smaller margins than for *mesqa* management.

**Recommendation:** Continue to promote privatization through an increased role for farmers in *mesqa* and branch canal management, explicitly mentioning the benefits of keeping the *mesqa* clean, organizing better water delivery, and resolving complaints. Demonstrate how the benefits outweigh the costs in time and effort.

In the PRA study, some men farmers were aware of difficulties in selecting a head of a WUA, because no farmer who met the selection criteria was willing to take on the responsibility.

Women are excluded from community management systems. Even when they hold land in their own names, they are not expected to attend meetings, but to send male relatives. A woman would only attend meetings if she had no male relative to act for her.

**Table 6-8 Farmers' Attitudes Toward Increased Role in Water Management by Education**Percent distribution of men farmers' attitudes toward increased role managing the *mesqa* and the branch canal by education, National Survey 2001.

Variable & Category	Men				Total
	Education				
	No education	Primary	Prep.	Sec. or Higher	
<b>Need to Have a (Greater) Role in Managing the <i>mesqa</i></b>					
Yes	34.2	53.2	46.8	34.2	37.8
No	65.8	46.8	53.2	65.8	62.2
<b>The Benefits (MR)</b>					
Cleaning <i>mesqa</i>	38.0	47.9	55.0	45.6	42.0
Management irrigation/in turn	27.4	31.2	28.4	34.6	29.6
Disinfecting/covering sides of <i>mesqa</i>	25.7	31.2	27.5	36.3	28.8
No benefit	29.8	17.3	15.6	17.0	24.5
Solving problems between farmers	16.4	26.6	31.2	26.5	20.8
Complaints delivery and follow up	8.1	13.2	14.7	20.0	11.6
Set fining system for throwing garbage in <i>mesqa</i>	4.8	7.4	7.3	7.1	5.8
Information about irrigation	1.4	0.8	0.9	4.1	1.9
Other	7.3	5.8	8.3	3.9	6.4
<b>The Disadvantages (MR)</b>					
No disadvantage	51.1	42.2	44.0	47.7	48.6
Needs effort	24.8	28.2	23.9	17.4	23.8
No time	13.3	24.9	26.6	30.1	19.3
Headache	15.4	18.6	20.2	11.6	15.4
No collaboration between farmers	8.1	11.0	10.1	8.4	8.7
Needs money	3.2	5.2	2.8	2.2	3.3
Other	3.3	1.6	1.8	0.4	2.4
<b>Need to Have a (Greater) Role in Managing the Branch Canal</b>					
Yes	25.6	40.8	40.2	35.0	30.8
No	74.4	59.2	59.8	65.0	69.2
<b>The Benefits (MR)</b>					
Increasing water in canal	29.3	39.3	43.9	32.5	32.4
No benefit	36.7	24.0	22.4	23.5	31.3
Canal disinfection	26.5	32.1	34.6	41.0	30.6
Cleaning canal	26.3	38.4	44.9	32.8	30.6
Managing rotations	12.5	13.9	17.8	16.1	13.7
Solve conflicts between farmers	8.2	15.0	9.3	11.7	10.1
Covering sides of canal	6.6	5.2	6.5	13.7	7.7
Covering canal	6.1	7.8	7.5	8.5	6.9
Canal enlargement	4.8	9.2	8.4	8.7	6.5
Complaints followed up by authorities	3.4	6.4	3.7	8.7	4.9
Getting information about irrigation	0.6	1.2	0.0	0.5	0.7
Other	2.1	2.3	1.9	3.6	2.4
<b>The Disadvantages (MR)</b>					
No disadvantage	42.9	35.0	43.0	41.3	41.2
Needs effort	31.7	33.8	24.3	19.1	29.3
No time	18.1	29.8	27.1	35.8	23.9
Headache	16.9	21.7	19.6	12.0	17.0
No collaboration between farmers	6.8	9.8	7.5	5.2	7.1
Needs money	4.5	6.6	5.6	4.4	4.9
Other	5.3	4.6	8.4	3.0	4.9
<b>Number of Farmers</b>	<b>1328</b>	<b>365</b>	<b>109</b>	<b>465</b>	<b>2267</b>

## 6.2 CHANGES IN ATTITUDES

To assess the changes in farmers' attitudes between the 1998 and 2001, selected attitudinal indicators are presented in Table 6-9.

The findings as presented in Table 6-9 indicate a significant change in many measures of farmers' attitudes towards the Ministry. Farmers appear to have a growing feeling that the Ministry has a relatively easy job and should be doing it better. The proportion of men and women who feel that the Ministry's task of providing farmers with water is a hard or very hard task dropped significantly between 1998 and 2001: from 54 percent to 32 percent among men, and from 41 percent to 20 percent among women.

<b>Table 6-9 Comparison of Levels of Attitude About Water Issues and Water Management Between 1998 and 2001 by Sex</b>				
Percentage distribution of farmers by levels of attitude about water issues and water management between 1998 and 2001, National Survey 2001.				
Attitudinal Indicator	Men		Women	
	1998	2001	1998	2001
<b>Attitudes Towards Ministry</b>				
The Ministry has a hard or very hard job providing water	54.4	<b>31.6</b>	40.9	<b>20.4</b>
The Ministry could do a better job	81.5	<b>87.1</b>	74.5	<b>84.2</b>
<b>Greatest Concern for the Future</b>				
Water doesn't arrive	76.4	<b>57.7</b>	64.9	54.5
Availability of enough clean water	15.5	<b>43.3</b>	11.7	<b>41.9</b>
Cost of irrigation water	1.9	<b>10.9</b>	1.6	<b>8.6</b>
Salinity of irrigation water	3.1	<b>9.0</b>	4.3	3.9
Low levels at the High Dam	1.5	<b>5.6</b>	0.5	<b>1.4</b>
Covering the canal	1.6	3.0	0.5	<b>2.9</b>
<b>Willing to Share in Costs of</b>				
Upgrading irrigation system	76.4	<b>85.0</b>	50.0	<b>67.7</b>
Upgrading drainage system	72.7	<b>82.7</b>	47.3	<b>65.9</b>
<b>Would Join if a WUA were Formed Nearby</b>	77.7	74.7	36.7	<b>24.0</b>
<b>Number of Farmers</b>	<b>1910</b>	<b>1980</b>	<b>188</b>	<b>279</b>
<i>Among those who would join:</i>				
<b>Reason for Joining WUA: (MR)</b>				
Solve water problems	54.0	61.2	60.9	41.8
Benefit of land	41.6	<b>55.3</b>	34.8	55.2
Benefit of farmer/farmers	69.3	<b>42.5</b>	33.3	44.8
Take care of <i>mesqa</i>	7.6	<b>37.2</b>	5.8	<b>20.9</b>
Complaints reach MWRI staff	0.4	<b>10.1</b>	1.4	4.5
Get information about <i>mesqa</i>	2.2	1.8	1.4	1.5
<b>Areas Willing to Participate in: (MR)</b>				
Resolving conflicts	96.0	97.2	62.3	44.8
Sharing cost of <i>mesqa</i> maintenance	91.7	94.4	75.4	76.1
Electing representatives	93.7	<b>89.5</b>	69.6	68.7
Planning with engineer	89.2	<b>78.1</b>	42.0	28.4
Setting regulations of WUA	87.1	<b>71.6</b>	34.8	26.9
<b>Number of Farmers</b>	<b>1484</b>	<b>1479</b>	<b>69</b>	<b>67</b>
Figures in <b>bold</b> indicate that the 2001 figure is significantly different from the 1998 figure.				

**Recommendation:** Communication materials about the Ministry need to balance messages regarding successes with the difficulty of many tasks it is undertaking.

While it may appear gratifying that the proportion of farmers who would want to discuss their need for more water with a senior official has dropped significantly since 1998, at the time of the fieldwork,

there were floods in Sudan, and the Ministry was forced to release additional water from Lake Nasser, so that in some areas of Egypt farmers were even suffering from excess water. Note that the data for the 1998 survey were collected in May 1998.

**Recommendation:** If the KAP survey is repeated in 2004, plan the dates of fieldwork to facilitate comparison with previous data.

The data also show significant increases in farmers' concern about water pollution and the cost of irrigation. The proportion of men and women farmers whose main concern is the fact that water doesn't arrive at their fields on time has dropped to about half – a significant drop from 76 percent to 58 percent among men, and a drop but not a significant one among women, to 55 percent. However, the proportion of farmers concerned about the availability of adequate clean water has increased nearly fourfold: from 16 percent to 43 percent among men, and from 12 percent to 42 percent among women. Men are also increasingly worried about salinity of irrigation water. The proportion of farmers concerned about the cost of irrigation has increased fivefold: from 2 percent to 11 percent among men, and from 2 percent to 9 percent among women.

The data show significant increases in farmers' willingness to share in the costs of upgrading the irrigation and drainage systems, even among women. Men's willingness to pay has increased from the 70 percent range into the 80 percent range, and women's willingness to pay has increased from the 50 percent range to the 60 percent range.

The data show no change in farmers' willingness to join a WUA if one were formed nearby. Among those who would join, there is a significant increase in understanding that the *mesqa* will be better maintained with a WUA, and among men, that benefits will accrue to the land and that it represents a new communication channel to the Ministry.

**Recommendation:** Continue to promote Branch Canal Water User Associations, showing how farmers can take an active role in addressing their greatest concerns about irrigation – water arriving on rotation, and the availability of an adequate supply of clean water.

The data also show significant declines in willingness to play certain roles in a WUA, but the levels of willingness to participate remain high for every area.

## IRRIGATION PRACTICES

## 7

As discussed in chapters 5 and 6, a better understanding of farmers' knowledge and attitudes sets the background for efforts to change farmers' behaviors. This chapter illustrates the actual irrigation and agricultural practices of Egyptian farmers. This chapter will highlight both general irrigation practices and determinants of crops selection. The 1998 survey showed that there were significant differences in practices by location of *mesqa* on canal (ie., whether the *mesqa* lay at the beginning or end of the canal). Hence, this chapter does provide comparison by location of *mesqa* on canal. The analysis by *mesqa* location is provided for men farmers in the Nile valley only, since the number of women farmers is not sufficient for this comparison, and the location of *mesqa* on canal does not apply to groundwater areas. Finally, at the end of the chapter a comparison between the results of the 1998 and 2001 surveys will be discussed.

### 7.1 GENERAL PRACTICES

#### 7.1.1 Seasonal Frequency of Irrigation

Table 7-1 shows the distribution of farmers according to their practices in irrigation by region and sex. The table presents irrigation practices in summer and winter. The average number of summer irrigations is 20-22 irrigations per farmer, whether in the Nile valley or groundwater areas. In groundwater areas and among women farmers, seven of twenty summer irrigations are carried out at night, while in the Nile valley, 10 of 22 summer irrigations are performed at night. As shown in Figure 7-1, over 50 percent of summer irrigations in the Middle and East Delta are carried out at night.

Irrigation patterns vary considerably by region, naturally, due to varying weather, soil, and cropping patterns. The average West Delta farmer irrigates his fields 34 times in the summer, compared to 9 times among Upper Egyptian farmers.

In the winter, the mean number of irrigations per farmer is 10 irrigations, of which only 2 are carried out at night. Very little night irrigation is done in Middle or Upper Egypt in the winter, and even a West Delta farmer can be expected to go out at night to irrigate only about four times during winter.

PRA participants suggested that women farmers try to avoid night irrigation because they do not care to be out in the dark, and because, if they are single, being out at night may reflect badly on their reputations.

#### 7.1.2 Land Leveling

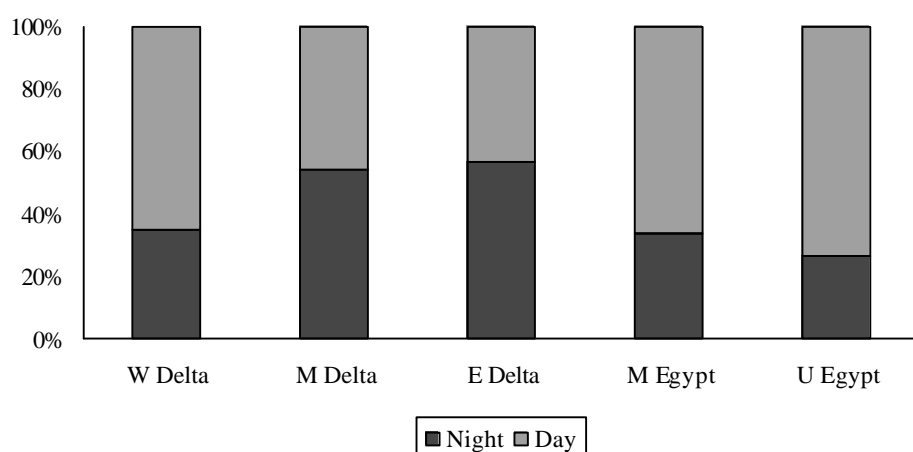
Table 7-1 also presents by region the proportion of farmers who level their land and the methods used. Virtually all farmers in the Nile valley level their land, while some 21 percent of farmers in groundwater areas do not do so. Very few farmers in the Nile valley level their land by hand: most (78 percent of men and 83 percent of women) use a mechanical cultivator, while some use a manual cultivator pulled by an animal (19 percent of women and 18 percent of men). One in ten men farmers in the Nile valley levels his land by laser, while the majority of farmers in groundwater areas do so (72 percent).

**Table 7-1 Farmers' Practices in Irrigation by Region and Sex**

Percent distribution of farmers according to their practices in irrigation by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
<b>Total Number of Summer Irrigations</b>								
0-6	3.4	0.9	11.6	2.0	41.1	11.6	20.7	6.9
7-11	13.3	12.4	11.6	66.7	39.8	28.7	26.3	35.0
12+	83.3	86.7	76.8	31.3	19.1	59.7	53.0	58.0
<b>Mean Number of Summer Irrigations</b>	<b>34.1</b>	<b>27.8</b>	<b>28.8</b>	<b>10.4</b>	<b>8.6</b>	<b>21.9</b>	<b>20.5</b>	<b>20.2</b>
<b>Number of Night Irrigations in Summer</b>								
0	24.1	12.7	19.0	28.8	60.5	28.3	58.6	41.5
1-5	22.4	35.1	10.7	42.6	24.7	27.2	2.5	28.0
6+	53.4	52.2	70.3	28.6	14.9	44.5	38.9	30.5
<b>Mean Number of Night Irrigations in Summer</b>	<b>12.0</b>	<b>15.0</b>	<b>16.3</b>	<b>3.5</b>	<b>2.3</b>	<b>10.2</b>	<b>7.1</b>	<b>7.3</b>
<b>Total Number of Winter Irrigations</b>								
0-4	10.2	2.0	24.0	2.2	11.7	10.1	9.1	11.3
5-7	33.0	14.4	54.4	51.7	44.0	39.2	24.0	38.2
8+	56.8	85.6	21.6	46.1	44.3	50.7	66.9	50.5
<b>Mean Number of Winter Irrigations</b>	<b>18.6</b>	<b>13.0</b>	<b>6.1</b>	<b>7.3</b>	<b>7.6</b>	<b>10.2</b>	<b>8.7</b>	<b>9.1</b>
<b>Number of Night Irrigations in Winter</b>								
0	67.3	40.2	36.4	52.2	73.5	52.2	54.0	61.3
1-2	15.6	27.1	19.3	24.6	9.8	19.8	3.5	21.5
3+	17.0	32.7	44.2	23.2	16.7	28.0	42.5	17.2
<b>Mean Number of Night Irrigations in Winter</b>	<b>3.6</b>	<b>2.7</b>	<b>2.5</b>	<b>1.3</b>	<b>1.1</b>	<b>2.4</b>	<b>1.9</b>	<b>1.2</b>
<b>Proportion Who Level the Land</b>	89.2	99.3	98.9	98.8	99.2	97.6	79.1	96.8
<i>Among those who level the land</i>								
<b>Method Used to Level Land (MR)</b>								
By hand	0.4	3.6	5.6	5.7	16.6	6.6	0.0	5.6
By manual cultivator	20.9	14.7	17.3	20.4	23.5	19.0	0.0	18.1
By mechanical cultivation	88.2	92.0	85.9	65.1	55.9	77.5	28.2	83.0
By laser	3.8	0.0	13.7	18.5	12.0	9.8	71.8	3.0
<b>Number of Farmers</b>	<b>295</b>	<b>451</b>	<b>451</b>	<b>406</b>	<b>377</b>	<b>1980</b>	<b>287</b>	<b>279</b>

**Figure 7-1**  
**Proportion of Summer Irrigations Carried Out by Day and by Night by Region**





### 7.1.3 Irrigation from Drains

Many farms in Egypt are located along a drain: some drains are covered by the fields, lying directly under the fields, while other drains run alongside the fields, and are open. When farmers experience water shortages at critical times, they may use water from drains to irrigate, feeling that it is better to use this water than no water at all. All groundwater farmers and about half of all farmers in the Nile valley have fields located on open drains. Table 7-2 presents the percentage of land located on an open drain and the distribution of farmers who irrigate from drains by region and sex. Farmers in groundwater areas do not irrigate from drains, while just under half of all farmers in the Nile valley do so, with considerable variation by region: farmers in Upper Egypt rarely irrigate their land using water from drains (2 percent), while a third to a half of farmers in all other regions irrigate from drains.

Table 7-2 Source of Irrigation Water by Region and Sex								
Percent distribution of farmers by source of irrigation water by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Farm located on an open drain	38.6	53.8	85.1	37.6	14.6	47.9	100.0	49.5
Among farms located on a drain								
Farmer irrigates from drain	52.6	44.0	52.2	37.9	1.8	44.9	0.0	42.0
Number of Farmers	295	451	451	406	377	1980	287	279

Tables 7-3 shows the distribution of farmers who irrigate from drains by *mesqa* location. Farmers at the end of the canal are significantly more likely to irrigate from drains than those at the beginning of the canal (55 percent and 34 percent respectively), which may reflect more frequent water shortages faced by farmers at the end of the canal than at the beginning.

<b>Table 7-3 Source of Irrigation Water by Mesqa Location</b>			
Percent distribution of farmers by source of irrigation water and location of <i>mesqa</i> , National Survey 2001.			
Variables & Category	Men		
	<i>Mesqa</i> location on canal		
	Beginning	End	Total
Farm located on an open drain	43.8	52.6	47.9
<i>Among farms located on a drain</i>			
Farmer irrigates from drain	33.8	55.4	44.9
<b>Number of Farmers</b>	<b>1054</b>	<b>926</b>	<b>1980</b>

Virtually all men farmers (91 percent) recognize that use of drainage water for irrigation lowers crop yields, reduces soil fertility, and adversely affects human health, and a further 48 percent cite effects on animal health. The proportions are similar among women farmers (not shown in table).

The drains have been replaced in the fields of 6 percent of farmers, primarily in Middle Delta (7 percent), East Delta (13 percent) and Middle Egypt (6 percent). Of 114 farmers whose drains were replaced, only two were compensated for lost growing time (not shown in table).

The PRA findings show that farmers only irrigate from drains when forced to by lack of water at critical times. Its disadvantages are that it is more difficult to irrigate from the drain, since the water must be filtered, and the filter cleaned frequently, in addition to the health hazards inherent in working with drainage water, are the danger of snakes, and the fact that the use of drainage water increases soil salinity.

#### 7.1.4 Determinants of Crops Selection

Table 7-4 presents the distribution of farmers' reasons for crop selection, by region and sex. Farmers were asked about the main reasons for crop selection.

In groundwater areas, the leading determinants of crop selection are market price (71 percent), cost of agricultural inputs (54 percent), and availability of agricultural inputs (24 percent), while household usage was mentioned by only 13 percent of farmers.

Among men in the Nile valley, the leading determinants are household usage (46 percent) and feeding livestock (39 percent). Economic factors such as market price (38 percent), quantity of water needed (30 percent), and cost of agricultural inputs (11 percent) form a second tier of determinants, followed by crop considerations such as neighbor's cultivation (29 percent), crop rotation (27 percent) and type of soil (12 percent).

Table 7-4 Reasons for Crop Selection by Region and Sex								
Percent distribution of farmers by reason for crop selection by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Reason for Crop Selection (MR)								
Household usage	8.5	40.1	30.4	71.4	72.1	45.7	12.9	53.4
Feeding livestock	1.7	44.8	12.6	71.7	56.5	38.8	1.4	38.4
Market price	18.6	42.4	24.8	61.8	38.5	38.1	71.4	27.6
Quantity of water	28.1	41.0	50.8	21.2	3.4	30.1	1.4	19.7
According to neighbor's cultivation	7.8	24.8	39.9	25.9	38.7	28.6	0.7	29.4
Crop rotation	46.4	9.8	45.7	4.4	1.1	20.7	0.7	22.9
Type of soil	7.5	13.3	31.0	1.2	1.9	11.8	18.1	4.3
Cost of agriculture inputs	11.9	31.9	4.2	3.9	2.7	11.3	54.0	7.5
According to area of land	9.5	9.8	9.5	2.2	8.8	7.9	0.3	3.2
Availability of agriculture inputs	4.1	15.3	2.4	9.4	0.5	6.7	24.4	4.7
Level of effort	0.0	10.2	3.5	7.1	0.8	4.7	1.7	6.5
Other	7.8	1.8	1.8	0.0	0.0	2.0	22.0	1.8
Mean Number of Reasons for Crop Selection on Normalized Scale (max. 10) <sup>7</sup>								
Household considerations	0.5	4.3	2.2	7.2	6.4	4.2	0.7	4.6
Crop-related considerations	2.1	1.6	3.9	1.1	1.4	2.0	0.7	1.9
Economic considerations	1.2	2.5	1.6	1.8	0.9	1.7	2.6	1.2
Number of Farmers	295	451	451	406	377	1980	287	279

<sup>7</sup> Normalized scales account for the fact that there is a different maximum number of items in each scale (ie. 6 economic items, 3 crop-related items, and 2 household items). On a normalized scale, if a farmer mentions two household items, his scale value is ten. If he mentions one household item, his scale value is five. This makes the three scales comparable despite the different number of items in each.

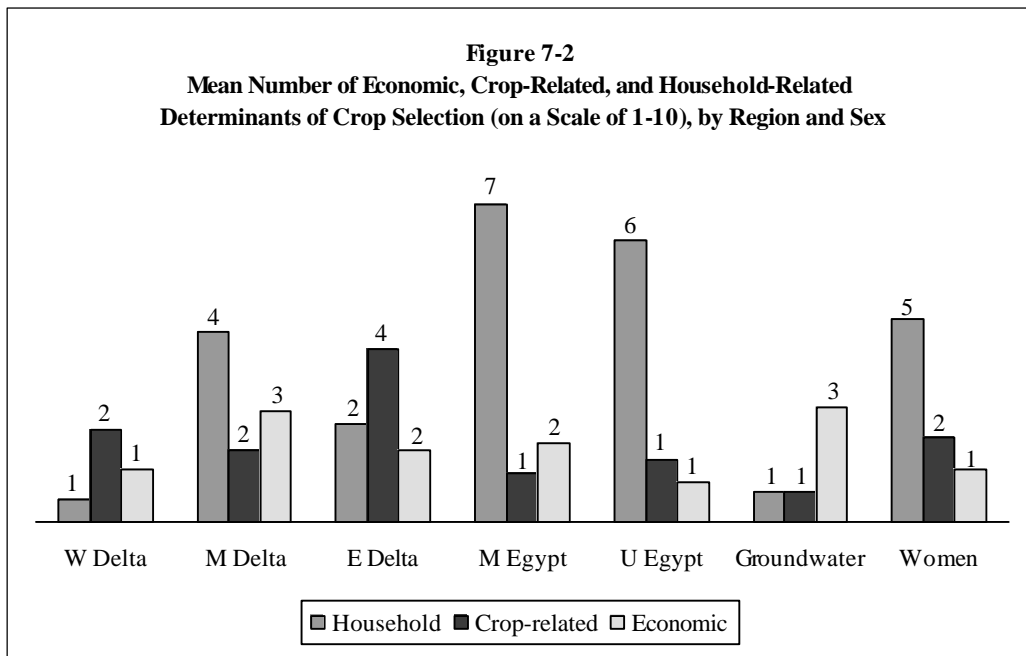
Among just over half of women farmers (53 percent), household usage is the main determinant of crop selection, followed by feeding livestock (38 percent). Cropping pattern considerations follow, at 29 percent citing neighbor's cultivation and 23 percent citing crop rotation respectively, with economic considerations last: 28 percent cited market price, 20 percent cited quantity of water, and 8 percent cost of agricultural inputs.

Figure 7-2 groups reason for crop selection into three categories and illustrates regional differences. The categories are:

- Economic factors: market price, quantity of water, cost of agricultural inputs, availability of agricultural inputs, level of effort, and area of land.
- Crop-related factors: type of soil, crop rotation, and according to neighbor's cultivation.
- Household-related factors: household usage, feeding livestock.

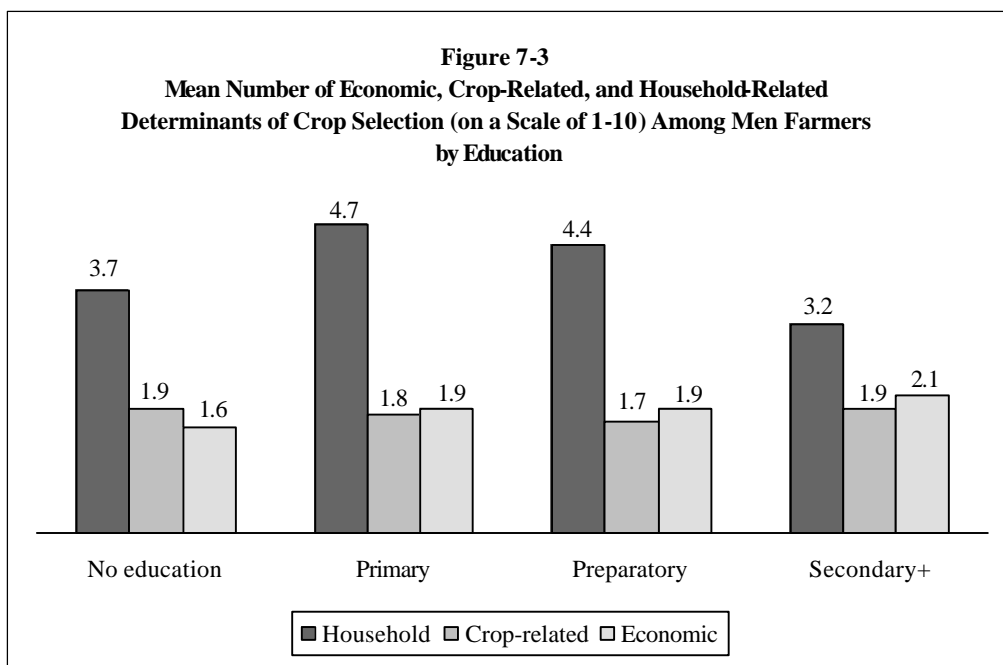
The Figure shows that women farmers and farmers in Middle and Upper Egypt are mainly farming for household use, while farmers in groundwater areas are mainly selecting crops using economic determinants.

**Recommendation:** Inform farmers that whenever they seek advice in crop selection, the irrigation engineer has information about the water required to help them in their decision.



Differences by level of education are presented in Table 7-5 and illustrated in Figure 7-3.

Table 7-5 Reasons for Crop Selection by Education					
Percent distribution of farmers by reason for crop selection by education, National Survey 2001.					
Variables & Category	Men				Total
	Education			Sec. Or Higher	
	No Education	Primary	Prep.		
Reasons of Selecting Crops (MR)					
Market price	35.7	45.2	49.5	57.2	42.3
Household usage	41.9	46.3	44.0	36.1	41.6
Feeding livestock	31.7	48.2	44.0	27.3	34.1
Quantity of water	27.0	29.3	29.4	22.2	26.5
According to neighbor's cultivation	26.7	26.3	22.9	20.0	25.1
Crop rotation	19.2	20.3	15.6	14.0	18.1
Cost of agriculture inputs	14.5	18.4	9.2	23.4	16.7
Suits the soil	10.8	7.9	12.8	21.5	12.6
Availability of agriculture inputs	8.1	7.9	8.3	12.0	8.9
According to area of land	6.6	6.3	11.0	7.7	7.0
Other	5.9	2.2	3.7	2.4	4.5
Level of effort	4.2	6.3	5.5	3.0	4.4
Mean Number of Reasons for Crop Selection (MR)					
Household considerations	1.7	2.4	2.1	1.5	1.8
Economic considerations	1.5	1.7	1.8	2.2	1.7
Crop-related considerations	1.1	1.1	1.0	1.0	1.0
Number of Farmers	1328	365	109	465	2267



## 7.2 RICE CULTIVATION

Among the practices the Ministry would like to change over the long-term, change in rice cultivation is cited as the most important. As the proportion of farmers sowing short season rice

increases, these farmers will experience a longer Nili season – the season between winter and summer, and if they use it to plant additional crops, the cropping intensity will increase. Rice is an area in which the Ministry has made a great deal of effort, through policy and program changes. Table 7-6 shows that virtually all farmers in the Nile valley (93 percent of men and 82 percent of women) who have ever grown rice have heard of a variety of short-duration rice – a variety of rice that matures in less than the 160 days required by long duration varieties. These varieties of rice are virtually unknown among farmers in groundwater areas. When asked for the name of such a variety, 77 percent of farmers were able to respond with a correct name (either Giza 4000, Giza 177, Giza 178, Sakha 101 or Sakha 102). Almost all rice farmers in West Delta knew a correct name (93 percent), while 62 percent of Middle Delta farmers knew a correct name.

Around three-quarters of men and women farmers in the Delta had previously grown a short-duration variety, and 65 percent of men and 54 percent of women had sown such a variety in the summer of 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region					Total		
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt			
Ever heard of short-duration rice	92.6	88.1	94.9	--	--	93.0	1.3	81.5
Know correct name of a short-duration variety	92.6	62.2	75.5	--	--	77.3	*	74.1
Ever cultivated short-duration rice	92.1	75.5	73.4	--	--	78.4	*	72.2
Cultivated short-duration rice summer 2001	71.4	63.6	62.2	--	--	64.8	*	53.7
<b>Number of Farmers</b>	<b>189</b>	<b>143</b>	<b>429</b>	<b>--</b>	<b>--</b>	<b>761</b>	<b>225</b>	<b>108</b>
* Too few cases to analyze. -- Not applicable.								

### 7.3 CHANGES IN PRACTICES

While knowledge and attitudes may change over a relatively short period of time, practices change over a considerably longer period of time. Table 7-7 presents changes in monitoring indicators for irrigation practices between 1998 and 2001 for farmers in the Nile valley.

The data show that the mean number of summer and winter irrigations has increased significantly since 1998. The proportion of irrigations undertaken at night by men has remained steady in the summer at around 45 percent, and in winter at around 25 percent. Among women, the proportion has dropped for winter irrigations.

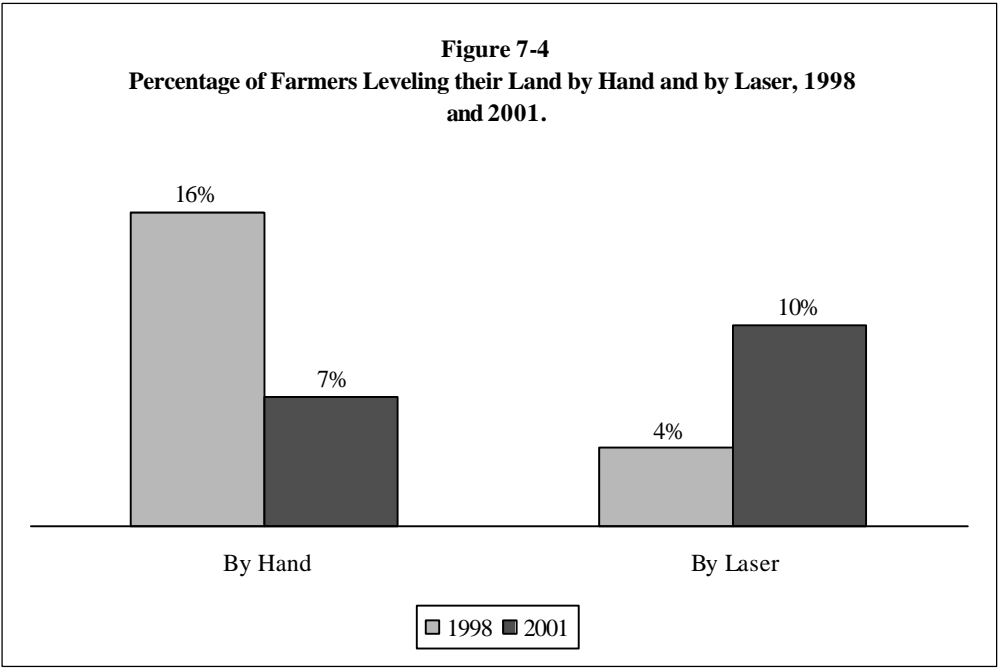
The proportion who level the land has decreased, but by a very small amount. What is more interesting is that the proportion of farmers leveling their land by hand has decreased, while the proportion leveling by laser has increased among men farmers, as illustrated in Figure 7-4.

The proportion of men farmers irrigating from drains has dropped significantly, from 51 percent to 47 percent, while among women the proportion has not changed significantly.

The main determinant of crop selection in Egypt continues to be household consumption and usage. The importance of market price has risen: in 1998, it was a factor for 27 percent of men farmers, and in 2001, it was a factor for 38 percent of men farmers. Cost of agricultural inputs as a factor also increased significantly.

**Table 7-7 Comparison of Levels of Irrigation Between 1998-2001 by Sex**  
Comparison of levels of irrigation practices between 1998 and 2001 by sex, National Survey 2001.

Practice Indicators	Men		Women	
	1998	2001	1998	2001
<b>Mean Number of Irrigations</b>				
In summer	15.2	<b>21.8</b>	18.8	20.2
In winter	7.2	<b>10.2</b>	7.0	<b>9.1</b>
<b>Mean Number of Night Irrigations</b>				
In summer	6.9	<b>10.2</b>	9.2	7.3
In winter	1.8	2.3	1.4	1.2
<b>Proportion Who Level the Land</b>	98.7	<b>97.6</b>	96.8	96.8
<i>Among those who level the land</i>				
<i>Methods of leveling:</i>				
By mechanical cultivator	87.5	<b>77.5</b>	91.0	83.0
By manual cultivator	5.8	<b>19.0</b>	3.7	<b>18.1</b>
By laser	4.2	<b>9.8</b>	0.5	3.0
By hand	16.3	<b>6.6</b>	9.6	5.6
<b>Land located on an Open Drain</b>	28.8	<b>46.9</b>	30.3	<b>49.5</b>
<i>Among farms located on a drain</i>				
Irrigate from drain	51.4	<b>44.9</b>	56.1	42.0
<b>Determinants of Crop Selection (MR)</b>				
Household usage	47.2	<b>45.7</b>	50.0	53.4
Feeding livestock	20.3	<b>38.8</b>	18.6	<b>38.4</b>
Market price	26.8	<b>38.1</b>	20.7	27.6
Quantity of water	34.3	<b>30.1</b>	30.9	<b>19.7</b>
Neighbor's cultivation	20.3	<b>28.6</b>	21.3	29.4
Crop rotation	13.6	<b>20.7</b>	18.1	22.9
Suits the soil	17.4	<b>11.8</b>	18.1	<b>4.3</b>
Cost of agricultural inputs	3.7	<b>11.3</b>	0.5	<b>7.5</b>
Area of land	1.7	<b>7.9</b>	2.1	3.2
Availability of agricultural inputs	1.6	<b>6.7</b>	1.6	4.7
Level of effort	7.2	<b>4.7</b>	5.3	6.5
<b>Number of Farmers</b>	<b>1910</b>	<b>1980</b>	<b>188</b>	<b>279</b>
<i>Among farmers who have ever grown rice</i>				
Percent who have ever grown a short-duration variety of rice	26.3	<b>78.1</b>	22.0	<b>72.9</b>
<b>Percent Who Grew a Short-Duration Variety of Rice Last Summer</b>	29.2	<b>64.5</b>	27.2	<b>54.2</b>
<b>Number of Farmers</b>	<b>856</b>	<b>764</b>	<b>92</b>	<b>107</b>
2001 figures in <b>bold</b> are significantly different from 1998 figures.				







## IRRIGATION PROBLEMS

## 8

This chapter discusses irrigation problems faced by farmers in general. These challenges include seasonal problems with water quantity, problems with water flow, problems with water quality, and consequences of irrigation and drainage problems. Most of the questions included in the current survey were asked in the 1998 survey. Differentials by region and location of *mesqa* on the canal will be presented in this chapter throughout the discussion. The analysis by location is presented for men farmers only due to the small number of women farmers interviewed. In groundwater areas, there are no Nile-fed canals, and their water is not provided on rotation. As shown in the following tables, there is a high degree of agreement between men's and women's reports of irrigation problems.

PRA participants linked increased water shortages to increased distance from the canal.

### 8.1 SEASONAL PROBLEMS WITH WATER QUANTITY

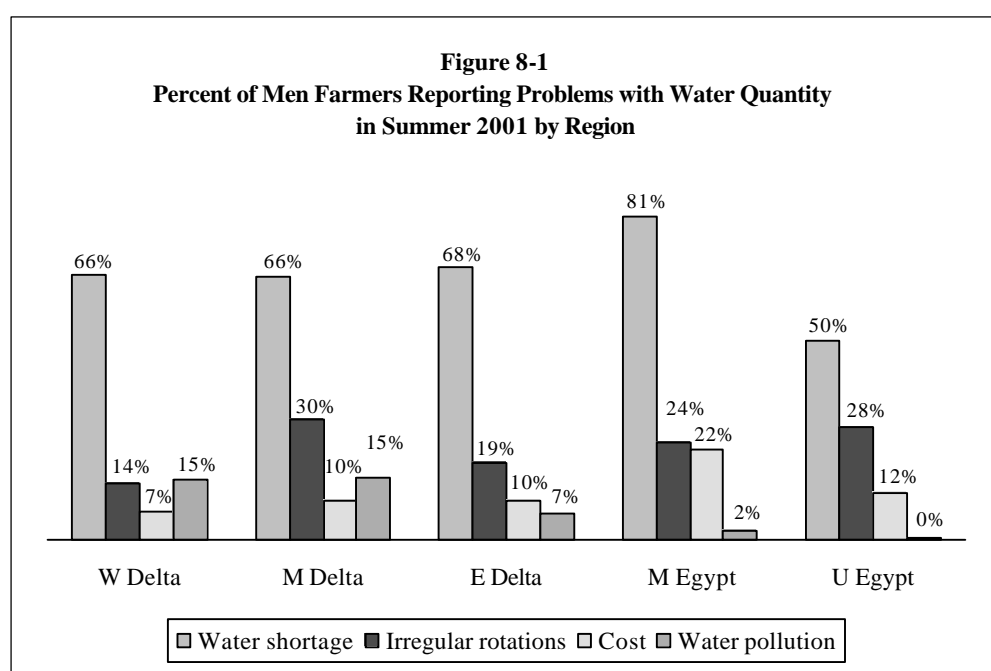
Table 8-1 takes a region-by-region look at seasonal irrigation problems: the level of water in *mesqas* in winter and summer, and irrigation problems in summer and winter. It is worth noting first that farmers in groundwater areas seem to have enough water in both seasons, and few report experiencing problems with irrigation.

Table 8-1 Seasonal Problems with Water Quantity by Region and Sex								
Percent distribution of farmers according to seasonal problems with water quantity by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
<b>Water in Mesqa for Irrigation in Summer</b>								
Enough	26.8	31.0	28.2	17.0	42.2	29.0	91.3	28.0
Was sometimes enough	36.6	9.5	12.0	13.3	30.0	18.8	0.0	15.8
Was not enough	36.6	59.4	59.9	69.7	27.9	52.2	8.7	56.3
<b>Irrigation Problems in Summer (MR)</b>								
No problem	27.5	29.3	23.9	18.0	39.0	27.3	90.9	27.2
Shortage of water	66.1	65.6	67.8	80.8	49.9	66.3	0.0	68.1
Irregular shifts	14.2	30.2	19.3	24.4	28.1	23.7	0.0	21.9
High cost of irrigation	7.1	10.0	10.0	22.4	11.7	12.4	0.0	9.7
Pollution of water	14.9	15.3	6.7	2.2	0.3	7.7	0.0	7.5
Saltiness of water	2.7	14.9	13.5	1.0	0.3	7.1	0.3	3.9
Pumps are crowded	0.0	0.0	0.0	0.0	0.0	5.1	0.0	3.9
Water is cold	9.5	7.1	7.8	1.0	0.5	0.0	0.0	0.0
Other	2.0	1.3	4.7	0.0	0.3	1.7	8.7	1.4
<b>Water in Mesqa for Irrigation in Winter</b>								
Enough	86.8	67.6	75.6	84.5	93.4	80.7	100.0	77.4
Was sometimes enough	4.4	12.2	14.0	7.1	4.2	8.9	0.0	10.4
Was not enough	8.8	20.2	10.7	8.4	2.4	10.5	0.0	12.2
<b>Irrigation Problems in Winter (MR)</b>								
No problem	82.4	57.0	69.2	86.2	84.9	74.8	99.3	74.2
Shortage of water	16.6	29.5	19.7	11.6	9.0	17.8	0.0	21.1
Irregular shifts	0.0	13.3	4.2	2.5	3.2	5.1	0.0	6.8
Pollution of water	9.2	9.3	2.9	2.0	0.0	4.5	0.0	3.6
High cost of irrigation	1.7	4.7	1.6	7.6	5.3	4.2	0.0	4.3
Saltiness of water	1.0	7.3	6.2	0.7	0.3	3.4	0.3	1.4
Water is cold	0.0	1.8	0.2	0.0	0.3	0.5	0.0	0.0
Pumps are crowded	1.0	0.7	0.4	0.0	0.3	0.5	0.0	0.7
Other	1.7	2.4	4.7	0.0	0.0	1.9	0.0	1.4
<b>Number of Farmers</b>	<b>295</b>	<b>451</b>	<b>451</b>	<b>406</b>	<b>377</b>	<b>1980</b>	<b>287</b>	<b>279</b>

Half of men and women farmers in the Nile valley reported that there was not enough water in the *mesqa* last summer, and only three in ten reported that they did have enough. Two-thirds of farmers reported that their main problem in the summer was a lack of water, while around a quarter of farmers said they had no problems with irrigation. A further quarter of farmers reported that their water did not come on schedule, and around ten percent of men and women farmers described the cost of irrigation as a problem.

By region, farmers in Upper Egypt are reported to suffer the least from water shortages in the summer, while farmers in Middle Egypt suffer the most from shortages. The proportion of men farmers in the three Delta regions complaining of shortages is uniformly two-thirds of farmers. Problems with irregular rotations are most common in the Middle Delta.

There is a very different picture with irrigation in the winter. During winter, eight in ten farmers report that there is enough water in the *mesqa*, and seven in ten report that they have no problems with irrigation in the winter. Farmers in the Middle Delta report experiencing more problems with winter irrigation than farmers in other regions.



The 1998 survey demonstrated that irrigation problems differ significantly by location of the *mesqa* on the canal, i.e. whether it is at the head or the tail of the canal. Thus, for this survey, half of the *mesqas* were selected at the beginning of canals and the other half at the end of canals. Table 8-2 presents differentials in seasonal problems with water quantity by position of the *mesqa* on the canal.

Table 8-2 shows greater differentials by *mesqa* position in the summer than in the winter. In the summer, 65 percent of farmers whose *mesqa* is at the end of a canal do not have enough water, compared to 41 percent of farmers at the beginning of a canal. In the winter, however, both percentages are low: 15 percent and 7 percent respectively. In the summer, the proportion of farmers at the beginning of a canal who experience no problems is twice as high as those at the end of a canal: 36 percent as compared to 18 percent. A greater proportion of farmers at the end of canals report experiencing irregular rotations and increased salinity.

Table 8-2 indicates most farmers do not experience problems with irrigation, regardless of *mesqa* position, during winter months.

**Table 8-2 Seasonal Problems with Water Quantity by Location of Mesqa on Canal**

Percent distribution of farmers according to seasonal problems with water quantity by position of *mesqa* on canal, National Survey 2001.

Variables & Category	Men		
	Mesqa Location		Total
	At the Beginning	At the End	
<b>Water in Mesqa for Irrigation in Summer</b>			
Enough	37.7	19.1	29.0
Was sometimes enough	21.3	16.0	18.8
Was not enough	41.1	64.9	52.2
<b>Irrigation Problems in Summer (MR)</b>			
No problem	35.9	17.6	27.3
Shortage of water	56.5	77.5	66.3
Irregular shifts	17.5	30.9	23.7
High cost of irrigation	11.8	13.2	12.4
Pollution of water	6.0	9.7	7.7
Saltiness of water	4.5	10.2	7.1
Pumps are crowded	4.1	6.3	5.1
Other	2.7	0.6	1.7
<b>Water in Mesqa for Irrigation in Winter</b>			
Enough	86.2	74.3	80.7
Was sometimes enough	7.1	10.9	8.9
Was not enough	6.6	14.8	10.5
<b>Irrigation Problems in Winter (MR)</b>			
No problem	78.9	70.2	74.8
Shortage of water	13.4	22.8	17.8
Irregular shifts	3.8	6.6	5.1
Pollution of water	3.5	5.7	4.5
High cost of irrigation	4.5	4.0	4.2
Saltiness of water	2.4	4.6	3.4
Water is cold	0.2	0.9	0.5
Pumps are crowded	0.2	0.8	0.5
Other	2.9	0.6	1.9
<b>Number of Farmers</b>	<b>1054</b>	<b>926</b>	<b>1980</b>

## 8.2 PROBLEMS WITH WATER FLOW

The Ministry's Irrigation Department uses a complex technology to provide 7.5 million farmers with the required amount of water at the right time. Data collected from individual farmers by Ministry of Agriculture *hood* observers about cropping patterns is aggregated to the national level and provided to the Irrigation Department. The Irrigation Department estimates the water levels required at each of five levels of canal that would result in farmers receiving the amount of water they need. These estimates are used to control the volume of water released from Lake Nasser.

The Ministry is obligated to provide water to the head of the *mesqa*: i.e., the point at which the *mesqa* takes off from the canal. The result of the Irrigation Department's work is an official rotation schedule for water in the canal. As long as water reaches the canal at the expected level, it should arrive in all *mesqas* on rotation.

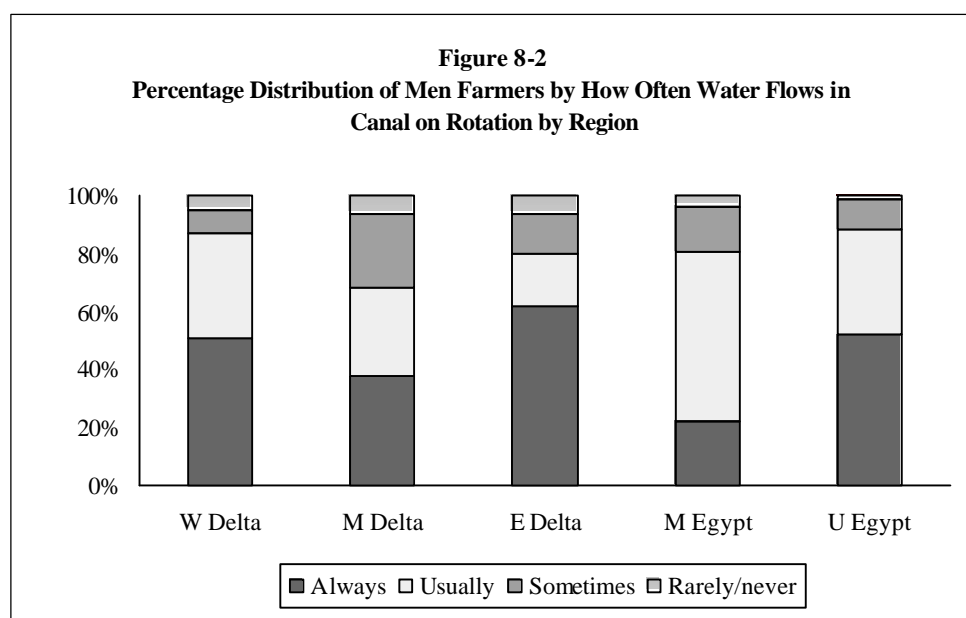
Table 8-3 examines information about the rotation on the branch canal, and whether water flows in the canal and *mesqa* on rotation. Farmers were asked: what is the official canal rotation? Their responses were compared to the information gathered from the district irrigation engineer, and

coded as either correct or incorrect. Overall, around seven in ten farmers in the Nile valley do have the correct information about the official canal rotation. There are considerable differences, however, by region: 38 percent of farmers in East Delta knew the official rotation, while 88 percent of Middle Delta farmers knew this information.

Table 8-3 Problems with Water Flow by Region and Sex								
Percent distribution of farmers according to the likelihood of water flowing on schedule in canals and <i>mesqas</i> by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Correct Knowledge of the Official Rotation on the Branch Canal	84.1	88.0	38.1	86.5	88.9	75.9	--	69.4
Actual Canal Rotation Matches Official Rotation	75.3	68.3	25.9	83.3	77.7	64.5	--	61.9
Water Flow in Canal on Schedule?								
Always	50.5	37.5	61.9	22.4	52.0	44.6	--	49.8
Usually	36.3	30.6	17.7	58.4	36.6	35.4	--	31.2
Sometimes	8.1	25.5	14.2	15.3	9.8	15.3	--	15.4
Rarely	4.7	4.4	4.2	3.9	1.6	3.8	--	2.9
Never	0.3	2.0	2.0	0.0	0.0	1.0	--	0.4
No canals	--	--	--	--	--	--	100.0	0.4
Water Flow in <i>Mesqa</i> on Rotation?								
Always	20.3	19.3	39.6	9.4	51.2	28.1	100.0	22.9
Usually	32.9	17.1	12.9	25.4	24.1	21.5	0.0	19.4
Sometimes	24.4	22.2	20.4	49.8	21.2	27.6	0.0	36.2
Rarely	9.2	28.6	15.1	13.8	3.2	17.8	0.0	11.8
Never	13.2	12.9	12.0	1.7	0.3	8.0	0.0	9.7
How Does this Year's <i>Mesqa</i> Rotation Schedule Compare to Last Year's?								
Same as last year	90.2	63.6	68.3	82.0	54.3	70.7	--	75.9
More regular	4.1	17.7	13.3	12.8	43.9	18.6	--	14.4
Less regular	5.8	18.6	18.4	5.2	1.9	10.7	--	9.7
Number of Farmers	295	451	451	406	377	1980	287	279

Farmers were then asked what was the actual canal rotation. These responses were again matched to the irrigation engineer's information about the official rotation, and coded as either matching the official rotation, or not. As shown in the table, around two-thirds of farmers said that the actual rotation matched the official rotation. This would seem to indicate that one-third of farmers are experiencing canal rotations that do not match the official rotation.

When asked how often water flows in the canal on rotation, almost half of men and women farmers responded that it always does so, while a third responded that it usually flows on rotation. Regional differences are illustrated in Figure 8-2. Farmers in East Delta are most likely to say that their water always flows in the canal on rotation, although it seems they do not rely on the official rotation as their measure of when they expect the water, rather they rely on the actual rotation. The canal rotation seems to be the biggest problem in the Middle Delta, although even there, almost seven in ten farmers always or usually receive water in the canal on rotation.



There was considerably more variation in water flowing in the *mesqa* on schedule than in the canal. Twenty-six percent of men and 22 percent of women farmers reported that the water in their *mesqa* rarely or never flows on rotation. There are significant differences by region, from three-quarters of farmers in Upper Egypt saying water always or usually flows on schedule to slightly more than one-third in Middle Delta.

In comparison to the year 2000, most farmers said that this year's *mesqa* rotations were as regular as last year's, although in Upper Egypt, 44 percent of farmers said they were more regular this year (2001).

Table 8-4 provides these data by position of *mesqa* on canal. There is no difference in knowledge of the official rotation, and a small difference in whether the actual rotation matches the official

<b>Table 8-4 Problems with Water Flow by <i>Mesqa</i> Location</b>			
Percent distribution of men farmers according to the likelihood of water flowing on schedule in canals and <i>mesqas</i> by position of <i>mesqa</i> on canals, National Survey 2001.			
Variables & Category	Men		
	<i>Mesqa</i> Location		Total
	At the Beginning	At the End	
<b>Correct Knowledge of the Official Rotation on the Branch Canal</b>	77.0	74.6	75.9
<b>Actual Canal Rotation Matches Official Rotation</b>	66.7	62.1	64.5
<b>Water Flow in Canal on Schedule?</b>			
Always	48.9	39.8	44.6
Usually	36.5	34.0	35.4
Sometimes	11.8	19.2	15.3
Rarely	2.3	5.5	3.8
Never	0.6	1.4	1.0
<b>Water Flow in <i>Mesqa</i> on Schedule?</b>			
Always	32.8	22.8	28.1
Usually	24.3	18.4	21.5
Sometimes	28.7	26.3	27.6
Rarely	10.7	19.3	17.8
Never	3.5	13.2	8.0
<b>Number of Farmers</b>	<b>1054</b>	<b>926</b>	<b>1980</b>

rotation. The report of water flowing on schedule in the canal is generally the same whether the *mesqa* is at the head or tail of the canal, but there are significant differences for water flowing in the *mesqa* on rotation: farmers at the tail of the canal are considerably more likely to say that water rarely or never flows in their *mesqa* on rotation.

### 8.3 PROBLEMS WITH WATER QUALITY

Water quality is compromised by solid, liquid and particulate contaminants. Each poses a different type of threat to irrigation and agriculture. Solid contaminants block waterways and obstruct water flow, while liquid and particulate contaminants can lower crop yield. (Note that the Ministry is responsible for the maintenance of canals, while farmers are responsible for the maintenance of *mesqas*.)

Farmers were asked how frequently their waterways are blocked. The results are displayed in Table 8-5. Around half of farmers reported that canals were never or rarely blocked by wastes, while a third said that they were sometimes blocked. There were significant variations by region. In East Delta, 64 percent of farmers reported that canals are never blocked by waste, whereas in Middle and West Delta, only 17 percent of farmers reported this situation.

It is much more common for the *mesqa* to be blocked by waste – and as *mesqas* are narrower than canals, waste here is more likely to block the flow of water. Table 8-5 shows the importance of farmers working to keep their *mesqas* clean. Seven in ten farmers report that they experience blockages. Regionally, almost nine in ten farmers in the Middle Delta report these blockages, compared to five in ten farmers in East Delta and Upper Egypt. The situation is certainly the worst in Middle Delta, where 41 percent of farmers report that their *mesqas* are always or usually blocked by waste.

Table 8-5 Problems with Water Quality by Region and Sex								
Percent distribution of farmers reporting obstruction of <i>mesqa</i> , canals and drains by region and sex, National Survey 2001.								
Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
How Often is Canal Blocked by Waste								
Never	17.3	16.6	63.9	12.8	43.2	31.8	--	38.4
Rarely	33.9	17.1	10.6	20.9	18.0	19.1	--	17.9
Sometimes	35.3	47.7	15.5	53.9	30.2	36.5	--	34.8
Often	6.1	15.3	6.4	11.6	7.4	9.6	--	5.4
Usually	7.5	3.3	3.5	0.7	1.1	3.0	--	3.2
No canals	--	--	--	--	--	--	100.0	0.4
How Often is <i>Mesqa</i> Blocked by Waste								
Never	20.7	12.9	50.1	23.9	51.7	32.2	98.6	31.2
Rarely	22.7	8.9	6.0	36.2	16.7	17.4	1.4	13.6
Sometimes	32.2	36.8	21.3	27.8	27.6	29.0	0.0	30.5
Often	19.3	26.8	11.8	10.1	3.7	14.4	0.0	16.8
Usually	5.1	14.6	10.9	2.0	0.3	7.0	0.0	7.9
Number of Farmers	295	451	451	406	377	1980	287	279
<i>Among farms located on an open drain</i>								
How Often is Drain Blocked by Waste								
Never	12.8	6.1	56.5	4.2	39.4	21.6	93.7	22.3
Rarely	46.0	13.1	14.4	15.0	9.8	18.2	5.3	19.5
Sometimes	36.3	38.4	20.7	45.5	31.1	35.0	0.7	38.2
Often	4.9	29.1	5.4	32.5	18.1	19.9	0.4	18.7
Usually	0.0	13.3	3.0	2.8	1.6	5.3	0.0	1.2
Number of Farmers	226	443	333	354	193	1549	285	251

In areas with an open drainage network, drains also need to be kept clear. Drains are somewhat more likely to be blocked than *mesqas*, with 50 percent of farmers reporting at least occasional blockage of *mesqas*, compared to 60 percent reporting such blockages of drains. There are significant differences by region, varying from 46 percent of farmers in Middle Egypt reporting that drain sometimes blocked, to 21 percent in the East Delta.

PRA participants acknowledged that their own poor water management practices were at fault regarding throwing garbage, dead animals, and wastewater into the canal, blocking the flow and polluting the water. However, they also placed responsibility on the shoulders of the Ministry and other responsible authorities for raising the level of awareness among farmers and for implementing sanctions for misuse of water resources.

**Recommendation:** Demonstrate to farmers that WUAs and BCWUAs are a good way to maintain the *mesqa* and drains and prevent waste from blocking the flow of water.

Table 8-6 shows that farmers' experience of canals, *mesqas*, and drains being blocked by waste differs significantly by position of *mesqa* on the canal. Farmers at the end of a canal are more likely to experience canal, *mesqa*, and drain blockages than those at the beginning of a canal.

<b>Table 8-6 Problems with Water Quality by <i>Mesqa</i> Location</b>			
Percent distribution of farmers reporting obstruction of canals, <i>mesqas</i> , and drains by position of <i>mesqa</i> on canals, National Survey 2001.			
Variables & Category	Men		
	<i>Mesqa</i> Location		Total
	At the Beginning	At the End	
<b>How Often is Canal Blocked by Waste</b>			
Never	33.3	30.0	31.8
Rarely	21.5	16.3	19.1
Sometimes	35.9	37.1	36.5
Often	7.6	12.0	9.6
Usually	1.7	4.5	3.0
<b>How Often is <i>Mesqa</i> Blocked by Waste</b>			
Never	33.8	30.3	32.2
Rarely	18.0	16.6	17.4
Sometimes	30.1	27.8	29.0
Often	13.7	15.3	14.4
Usually	4.5	9.9	7.0
<b>Number of Farmers</b>	<b>1054</b>	<b>926</b>	<b>1980</b>
<i>Among farms located on an open drain</i>			
<b>How Often is Drain Blocked by Waste</b>			
Never	19.9	23.6	21.6
Rarely	21.2	14.8	18.2
Sometimes	34.8	35.2	35.0
Often	18.7	21.2	19.9
Usually	5.3	5.2	5.3
<b>Number of Farmers</b>	<b>824</b>	<b>725</b>	<b>1549</b>

Farmers were also asked about the general quality of water in the *mesqas*, and if polluted, what were the major causes of this pollution. They were also asked how to prevent *mesqas* from becoming polluted and about the cleaning of canals and *mesqas*. Tables 8-7 and 8-8 present the farmers' views on pollution of *mesqa* by region and position of the *mesqa* on the canal.

When asked whether the water in the *mesqa* was clean or polluted, 54 percent of men farmers and slightly less than half of women farmers reported that the water was polluted (see Table 8-7). These percentages differed significantly by region, ranging from 81 percent in the Middle Delta and Middle Egypt to 27 percent in West Delta.

Respondents who said their *mesqas* were polluted were asked about the major cause of this pollution. The most frequently cited causes of pollution were household wastewater (by 75 percent of men farmers and 82 percent of women farmers), dead animals (51 and 41 percent, respectively), and sewage (31 and 33 percent, respectively). There are differentials by region for the cause of pollution: the percentages of farmers reporting sewage as a source of pollution were highest in West and East Delta and lowest in Middle Egypt. Household wastewater was cited by a majority respondent in West Delta (82 percent). Dead animals as a source of pollution was reported more frequently by farmers from Middle and Upper Egypt (76 percent and 73 percent respectively).

PRA participants clearly had received the message from the Ministry not to wash laundry or dishes in the canal. During fieldwork in two of the five communities, women avoided doing so because they had heard that a delegation from the Ministry was in the village.

Farmers were also asked how to prevent *mesqas* becoming polluted. Cleaning *mesqas* was the method mentioned by more than half of farmers, followed by imposing a fine for throwing garbage and animals in *mesqas* (40 percent), and then covering the *mesqa* (30 percent). Some farmers suggested establishing a sewage system as a way to prevent pollution (10 percent).

When asked whose responsibility it is to clean the *mesqa*, around three-quarters of farmers said that it was farmers' responsibility (77 percent), and 40 percent that it was the responsibility of the agricultural cooperative. Regionally, it is interesting that only half of farmers in West Delta recognized that it is their responsibility to clean the *mesqa*, compared to 92 percent in Middle Egypt. Farmers in groundwater areas, the West Delta and in Middle Delta are more likely to put the responsibility on the agricultural cooperative.

**Recommendation:** Explain to farmers that by law, cleaning the *mesqa* is their responsibility, and that an efficient way to do it is through a WUA.

Farmers were asked if their canals and *mesqas* had been cleaned in the last year and, if so, how good was the cleaning. The majority of respondents felt that both types of waterways were well cleaned. Two-thirds of farmers reported that cleaning of canals and *mesqa* was good. However, there were significant differences by region. At the canal level the percentage of farmers reported that the cleaning of canal was good varies from half of farmers in Middle Egypt to 80 percent in West Delta. At the *mesqa* level, the proportion of farmers who said that their *mesqa* cleaning was of bad quality varied from 2 percent in Middle Egypt to 19 percent in Middle Delta.

PRA respondents indicated that it is usually the agricultural cooperative which carries out regular *mesqa* cleaning, but that if the *mesqa* needs additional cleaning, this is handled by the farmers as an informal group activity.



**Table 8-7 Levels of Water Pollution by Region and Sex**Percent distribution of farmers by level of water pollution in *mesqas* by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
<b>Mesqa Status</b>								
Clean	73.2	18.8	65.4	18.7	65.5	46.4	100.0	50.5
Contaminated	26.8	81.2	34.6	81.3	34.5	53.6	0.0	49.5
<b>Among farmers whose mesqa is contaminated</b>								
<b>Source of Contamination (MR)</b>								
Household wastewater, soap residue	82.3	76.5	67.3	74.4	74.6	74.7	--	81.9
Dead animals	1.3	46.7	10.9	76.4	73.1	50.5	--	41.3
Sewage	77.2	31.7	57.7	7.3	26.2	30.6	--	33.3
Bacteria (bilharzia & e-coli)	0.0	29.5	8.3	37.9	3.8	23.7	--	29.7
Pesticide & fertilizer residue	1.3	12.8	7.7	18.8	0.0	11.5	--	8.7
Drainage water	0.0	20.5	14.1	3.0	1.5	10.3	--	6.5
Industrial waste	6.3	6.8	4.5	0.3	0.0	3.6	--	2.2
Other	0.0	3.6	3.2	4.8	5.4	3.9	--	2.2
<b>Methods of Preventing Contamination (MR)</b>								
Clean <i>mesqa</i>	45.1	66.3	50.8	62.3	56.8	57.0	34.8	56.6
Fine for throwing garbage/dead animals	14.2	44.8	31.7	61.8	39.0	39.6	13.2	29.7
Cover <i>mesqa</i>	40.3	53.4	26.8	20.9	7.2	29.9	54.7	32.6
Cleaning canal	5.8	16.4	17.3	21.7	20.2	16.8	0.0	10.8
Lay sewer line	9.5	16.6	16.0	0.5	4.8	9.8	0.0	8.2
Other	22.4	6.2	7.3	5.9	7.2	9.0	22.6	11.1
<b>Who is Responsible for Cleaning Mesqa? (MR)</b>								
Farmers	49.2	81.2	89.6	91.9	65.0	77.4	19.9	77.4
Agricultural cooperative	74.9	63.2	21.7	40.9	4.2	39.7	79.1	47.7
Irrigation engineer	0.7	3.3	1.3	0.2	1.3	1.5	0.0	0.4
Agricultural engineer	0.0	0.7	0.2	0.2	0.0	0.3	0.0	0.4
Other	14.9	0.0	0.2	0.2	38.5	9.6	1.0	5.4
<b>Number of Farmers</b>	<b>295</b>	<b>451</b>	<b>451</b>	<b>406</b>	<b>377</b>	<b>1980</b>	<b>287</b>	<b>279</b>
<b>Among those whose canal was cleaned in the previous year</b>								
<b>Quality of Canal Cleaning</b>								
Good	80.4	61.5	66.0	52.0	74.8	66.3	--	70.2
Moderate	18.8	30.4	28.6	46.3	20.2	29.0	--	28.5
Bad	0.8	8.1	5.3	1.7	5.0	4.7	--	1.3
<b>Number of Farmers</b>	<b>255</b>	<b>431</b>	<b>430</b>	<b>298</b>	<b>337</b>	<b>1751</b>	<b>--</b>	<b>235</b>
<b>Among those whose mesqa was cleaned in the previous year</b>								
<b>Quality of Mesqa Cleaning</b>								
Good	63.8	49.4	67.5	46.5	81.0	62.3	99.6	60.8
Moderate	31.7	31.9	28.5	51.9	16.7	30.9	0.4	35.4
Bad	4.6	18.7	4.0	1.6	2.3	6.8	0.0	3.8
<b>Number of Farmers</b>	<b>240</b>	<b>395</b>	<b>421</b>	<b>258</b>	<b>353</b>	<b>1667</b>	<b>227</b>	<b>240</b>
-- Not applicable.								

As Table 8-8 shows, differences in the pollution of the *mesqa* or in the quality of canal cleaning by location of *mesqa* on the canal are not very striking.

Table 8-8 Levels of Water Pollution in Mesqa by Mesqa Location			
Percent distribution of men farmers by level of water pollution in mesqas by location of mesqa on canal, National Survey 2001.			
Variables & Category	Men		
	Mesqa Location		Total
	At the Beginning	At the End	
Mesqa Status			
Clean	46.4	46.4	46.4
Contaminated	53.6	53.6	53.6
Among those whose mesqa is contaminated			
Source of Contamination (MR)			
Bacteria (bilharizia & e-coli)	29.9	16.5	23.7
Pesticide & fertilizer residue	14.7	7.9	11.5
Household wastewater, soap residue	75.8	73.6	74.7
Industrial waste	3.7	3.4	3.6
Sewage	26.7	35.1	30.6
Dead animal	56.5	43.8	50.5
Drainage water	8.5	12.3	10.3
Other	1.8	6.3	3.9
Methods of Preventing Contamination (MR)			
Lay sewer line	5.8	14.5	9.8
Clean mesqa	56.5	57.6	57.0
Fine for throwing garbage/dead animal	40.7	38.4	39.6
Cover mesqa	31.2	28.5	29.9
Cleaning canal	16.0	17.7	16.8
Other	9.6	8.3	9.0
Who is Responsible for Cleaning Mesqa? (MR)			
Irrigation engineer	1.2	1.7	1.5
Agricultural engineer	0.2	0.3	0.3
Agricultural cooperative	41.1	38.1	39.7
Farmers	78.9	75.7	77.4
Other	10.1	9.3	9.6
Number of Farmers	1054	926	1980
Among those whose canal was cleaned in the previous year			
Quality of Canal Cleaning			
Good	69.6	62.3	66.3
Moderate	26.8	31.8	29.0
Bad	3.6	6.0	4.7
Number of Farmers	964	787	1751
Among those whose mesqa was cleaned in the previous year			
Quality of Mesqa Cleaning			
Good	62.6	61.9	62.3
Moderate	31.7	30.0	30.9
Bad	5.7	8.1	6.8
Number of Farmers	890	777	1667

#### 8.4 CONSEQUENCES OF IRRIGATION AND DRAINAGE PROBLEMS

Problems with irrigation and drainage have effects on agricultural productivity and therefore on economic growth. As it works to ameliorate irrigation problems, the Ministry is working to improve the prospects for Egypt's economic growth.

Table 8-9 examines the impact of irrigation and drainage problems on the prevalence of soil salinity and loss of agricultural production.

A third of men farmers and a quarter of women farmers report a problem with soil salinity, varying from a low of 14 percent in Upper Egypt to a high of 49 percent in East Delta.

Participants in the PRA study also linked the lack of good drainage with increasing soil salinity.

A third of men and women farmers reported that they lost crops due to lack of water in the year preceding the survey. This was a rare occurrence among groundwater farmers and farmers in Upper Egypt, while just over half of farmers in East Delta experienced crop losses due to lack of water.

Smaller proportions of farmers left land fallow due to lack of water: Eight percent of men farmers in both the Nile valley and groundwater areas, and 4 percent of women farmers. Again, this was most likely to occur in East Delta, where 20 percent of farmers reported that they had left land fallow due to lack of water. This is more likely to happen in the summer than year-round.

Farmers who left land fallow were asked about the area left uncultivated. Table 8-9 shows that in Middle Egypt, this is less of a problem than in East Delta. In Middle Egypt, almost all farmers who left land fallow due to lack of water left less than one feddan fallow, whereas in East Delta, a third of these farmers left one to two feddans fallow, and 14 percent left 3 or more feddans fallow.

**Table 8-9 Consequences of Irrigation and Drainage Problems by Region and Sex**

Percent distribution of farmers according to irrigation and drainage problems by region and sex, National Survey 2001.

Variables & Category	Men						Ground Water Areas	Women
	Region							
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	Total		
Have Problems with Soil Salinity	32.2	43.2	49.0	26.1	13.8	33.8	18.8	26.3
Lost Crops Due to Lack of Water	28.8	38.1	55.9	28.1	3.7	32.2	8.7	33.3
Left Land Fallow Due to an Inadequate Water	3.1	2.2	20.4	12.3	1.3	8.4	8.7	3.6
<i>Among those who left land fallow</i>								
When Was Land Left Fallow?								
Summer	66.7	90.0	90.2	84.0	80.0	86.7	100.0	80.0
Summer & winter	33.3	10.0	9.8	16.0	20.0	13.3	0.0	20.0
<i>Among those who left land fallow</i>								
Area Left Uncultivated								
< 1	*	*	53.3	98.0	*	63.3	8	*
1 – 2	*	*	32.6	2.0	*	25.3	0.0	*
3 +	*	*	14.1	0.0	*	11.4	92	*
Mean	*	*	1.9	0.4	*	1.8	3.7	*
Number of Farmers	295	451	451	406	377	1980	287	279

\* Too few cases to analyze.

Figure 8-3 shows the percentage of farmers who are experiencing soil salinity, who have lost crops due to inadequate water, and who left land fallow due to lack of water. Variations by region are also clear in the figure.

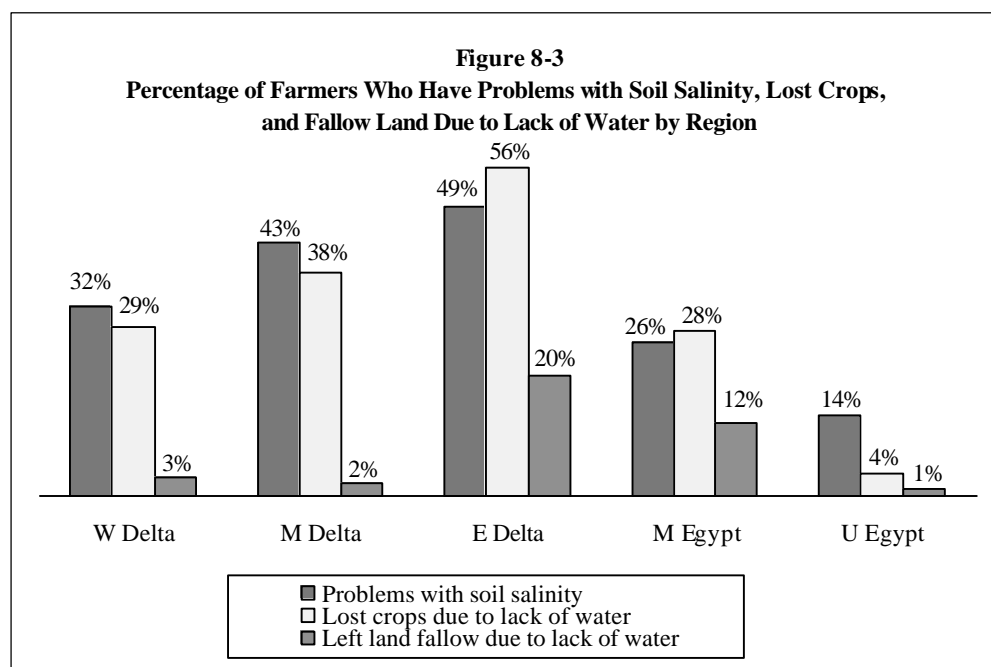


Table 8-10 examines differences in these variables by position of *mesqa* on canal. The data illustrate that farmers at the tail end of a canal are significantly more likely to have a problem with soil salinity than those at the head of a canal, and that they are more likely to have lost crops due to lack of water. However, the proportion of farmers who left land fallow is not significantly different.

<b>Table 8-10 Consequences of Irrigation and Drainage by <i>Mesqa</i> Location</b>			
Percent distribution of men farmers according to irrigation and drainage problems by <i>mesqa</i> location, National Survey 2001.			
Variables & Category	Men		
	<i>Mesqa</i> Location		Total
	At the Beginning	At the End	
Have a Problem with Soil Salinity	27.9	40.5	33.8
Lost Crops Due to Lack of Water	26.2	39.0	32.2
Left Land Fallow Due to Inadequate Water	8.0	8.9	8.4
<i>Among those who left land fallow</i>			
When was Land Left Fallow?			
Summer	85.7	87.8	86.7
Summer & winter	14.3	12.2	13.3
<i>Among those who left land fallow</i>			
Area Left Uncultivated			
< 1	64.3	62.2	63.3
1 – 2	25.0	25.6	25.3
3 +	10.7	12.2	11.4
Mean	1.5	2.1	1.8
Number of Farmers	1054	926	1980

## 8.5 CHANGE IN IRRIGATION PROBLEMS

Table 8-11 compares the levels of irrigation problems in 1998 to those in 2001. Differences are attributed to many factors, including freedom to select crops, changes in household use and market prices, changes in the weather, as well as changes due to the effect of work undertaken by the Ministry.

<b>Table 8-11 Comparison of Levels of Irrigation Problems Between 1998-2001 by Sex</b>				
Comparison of levels of irrigation problems in 1998 and 2001 by sex, National Survey 2001.				
Problem Indicators	Men		Women	
	1998	2001	1998	2001
<b>Problems with Water Quantity</b>				
Water in <i>mesqa</i> enough for irrigation in summer	14.5	<b>29.0</b>	11.7	<b>28.0</b>
Water in <i>mesqa</i> enough for irrigation in winter	54.5	<b>80.7</b>	53.2	<b>77.4</b>
<b>Irrigation Problems in Summer (MR)</b>				
Shortage of water	80.6	<b>66.3</b>	84.6	<b>68.3</b>
No problem	16.5	<b>27.3</b>	13.3	<b>27.0</b>
Irregular shifts	12.5	<b>23.7</b>	9.1	<b>21.9</b>
High cost	2.0	<b>12.4</b>	1.1	<b>9.7</b>
Saltiness of water	3.6	<b>7.1</b>	3.7	4.0
<b>Irrigation Problems in Winter (MR)</b>				
No problem	52.3	<b>74.8</b>	50.5	<b>74.1</b>
Shortage of water	40.1	<b>17.8</b>	41.5	<b>21.2</b>
Irregular shifts	10.1	<b>5.1</b>	9.6	6.8
High cost	1.5	<b>4.2</b>	1.1	<b>4.3</b>
Saltiness of water	1.4	<b>3.4</b>	2.7	1.4
<b>Water Usually or Always Flows in Canal on Rotation</b>	76.8	80.0	81.4	81.0
<b>Water Usually or Always Flows in <i>Mesqa</i> on Rotation</b>	52.5	49.6	51.1	<b>42.3</b>
<b>Problems with Water Flow and Quality</b>				
Canals are usually, or often blocked by waste	11.8	12.6	11.7	<b>3.6</b>
<i>Mesqas</i> are usually, or often blocked by waste	18.9	21.4	21.8	24.7
<b>Among farms in an area with drainage system:</b>				
Drains are sometimes, usually, or often blocked by waste	33.0	<b>60.2</b>	27.6	<b>58.4</b>
<b><i>Mesqa</i> Status: Clean</b>	53.8	<b>46.4</b>	59.6	<b>50.5</b>
<b>Consequences of Problems</b>				
Lost crops due to lack of water	57.0	<b>32.2</b>	57.4	<b>33.3</b>
Left land fallow due to an inadequate water	7.7	8.4	6.9	3.6
<b>Among those who left land fallow:</b>				
<b>When was Land Left Fallow</b>				
Summer	93.5	<b>86.7</b>	100.0	<b>80.0</b>
Summer and winter	6.5	<b>13.3</b>	0.0	<b>20.0</b>
<b>Mean Area Left Fallow (Feddans)</b>	1.2	<b>1.8</b>	0.6	<b>0.3</b>
<b>Number of Farmers</b>	<b>1910</b>	<b>1980</b>	<b>188</b>	<b>279</b>
Figures in <b>bold</b> are significantly different from 1998.				

In 2001, significantly more farmers had enough water for irrigation in the summer and winter: the proportion in the summer doubled to about three in ten farmers, and in the winter, it rose from about five in ten farmers to eight in ten. Consequently, the proportion of farmers saying they had no irrigation problems in the summer or winter went up: from 17 percent of men in 1988 to 27 percent in 2001, and from 13 percent of women in 1998 to 27 percent in 2001.

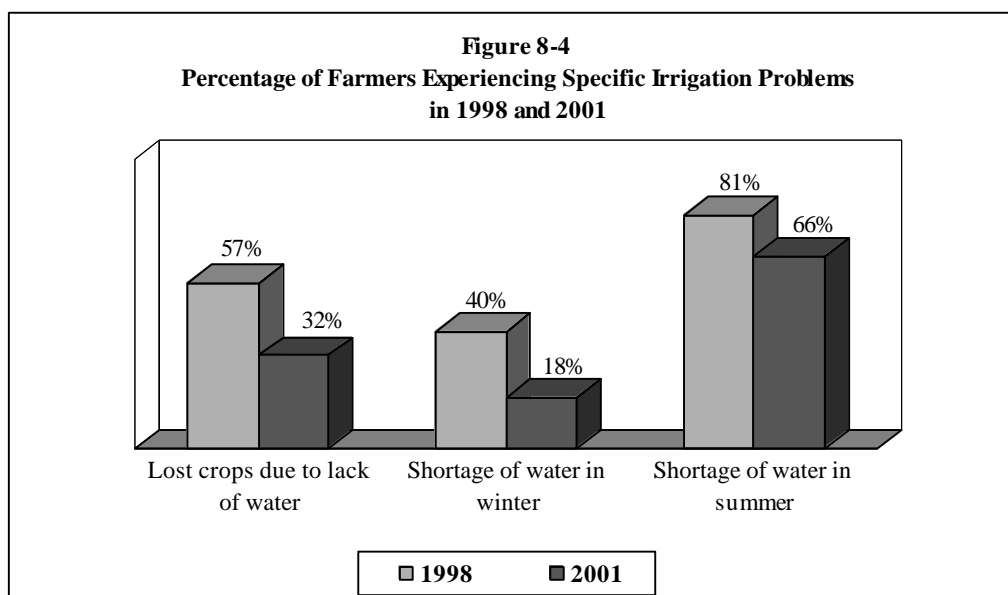
Simultaneously, the proportion of farmers saying they had no problems with winter irrigation went up from a half to three-quarters.

The data show no significant change in the proportion of farmers who report that water flows in their canals or *mesqa* on rotation, or in the proportion of men who say their canals or *mesqas* are blocked by waste.

The proportion of men farmers reporting that the water in their *mesqa* was clean dropped somewhat: from 54 percent in 1998 to 46 percent in 2001. An encouraging sign is the decrease in the proportion of farmers who reported lost crops due to lack of water: from 57 percent in 1998 to 32 percent in 2001.

While the proportion of farmers who left land fallow did not change significantly, the mean area left fallow by those who did so increased from 1.2 feddans to 1.8 feddans.

Figure 8-4 graphs a positive trend in problems that have diminished since 1998.



## WIVES' ROLE IN IRRIGATION

9

The Ministry needs information as to whether its efforts are equally successful among both men and women. In addition to interviewing all women farmers listed in the sample frame, a sub-sample of 509 wives in the Nile valley were interviewed in their homes. Wives were not interviewed in groundwater areas. The questionnaire used is a short version of the farmer's questionnaire. The results of this questionnaire are tabulated and presented in this chapter. The results will be presented in this chapter for the same topics that were presented in earlier chapters, namely communication, knowledge, attitudes, practices, and irrigation problems. Matched husbands' and wives' responses are presented in the tables, allowing us to get a sense of how much husbands and wives communicate on the subject of irrigation. A high level of agreement between their responses might indicate that farmers' wives would be a suitable target audience for communication activities, reflecting wives' integral roles in irrigation.

### 9.1 COMMUNICATION

Wives were asked about their exposure to the TV programs and TV spots on water and irrigation, and whether they had seen the posters that were produced by the Ministry. Only two wives reported ever seeing posters.

Table 9-1 presents data on exposure to communication through television. Wives were considerably less likely to have seen a spot than their husbands: almost half of husbands saw at least one spot, compared to less than a quarter of their wives. The mean number of spots seen by wives was less than half the mean number seen by their husbands: 0.5 compared to 1.1. When asked exactly which spot they had seen, husbands remembered seeing the spots on water pollution, rational water use, the new projects, and the water problem in Egypt. Wives remember seeing the same spots, but in smaller proportions. Among those who saw a particular spot, message recall was almost universal.

Exposure to TV programs is lower overall than exposure to TV spots, and again, wives' exposure is lower than their husbands' exposure: 9 percent compared to 27 percent. Similar differentials are shown for the mean number of TV programs seen: 0.7 for husbands and 0.2 for their wives. The frequency order of the programs is the same for husbands and wives, but with very different proportions. Both remembered the program on laser leveling best among the five programs, but 21 percent of husbands remembered it compared to 6 percent of wives. The least well-remembered program was the one on Water User Associations, at 4 percent of husbands and 2 percent of wives.

**Table 9-1 Couples' Exposure to TV Spots and TV Programs**

Percent distribution of wives and husbands by exposure to TV spots and programs, National Survey 2001.

Variable	Husband	Wife
<b>TV Spots</b>		
<b>Saw at Least One Spot</b>	46.5	23.5
<b>Mean Number of Spots Seen</b>	1.1	0.5
<i>Ever seen a TV spot about (MR)</i>		
Water pollution	30.4	16.1
Rational water use	28.2	12.4
New projects	26.5	6.7
Water problem in Egypt	14.3	6.1
Floods	3.1	1.4
Water User Associations	2.5	1.4
Role of MWRI	4.1	1.0
<i>Among those who saw a spot, percent who could correctly recall the spot</i>		
Rational water use	97.9	92.2
New projects	97.0	88.2
Water pollution	94.8	96.4
Water problem in Egypt	93.2	87.1
<b>TV Programs</b>		
<b>Saw at Least One Program</b>	27.1	8.8
<b>Mean Number of Programs Seen</b>	0.7	0.2
<i>Ever watched TV program about: (MR)</i>		
Laser leveling	20.6	6.1
Rationalizing water use	17.1	5.5
Maintaining canals	15.3	4.9
Irrigation Improvement Project	8.2	2.8
Water User Associations	4.1	1.8
<b>Number of Husbands and Wives</b>	<b>509</b>	<b>509</b>

## 9.2 KNOWLEDGE

Wives' knowledge about national water resources is presented in Table 9-2. Knowledge of all items is lower among wives. While almost all husbands know that the Nile is the main source of water in Egypt, not all of their wives know this.

While almost half of husbands know that Egypt's water quota is fixed, almost the same proportion of their wives do not know whether it is fixed or variable. The data indicate that about 39 percent of wives and 59 percent of husbands reported that Egypt can negotiate higher quota of water, while about 42 percent of wives said that they do not know. Around two-third of wives mentioned that they do not know the number of countries sharing the Nile with Egypt, compared with around one-fourth of their husbands. Wives who claimed to know the number of countries sharing the Nile with Egypt, mentioned an average number of 4 countries (one country fewer than their husbands).

While the vast majority of husbands and wives know that agriculture consumes the most water, there was some hesitation among wives, 11 percent of whom suggested it was households, and 5 percent of whom didn't know.

Almost eight in ten husbands have heard of Toushka, but only four in ten of their wives have heard of this enormous irrigation project under construction. Fewer than one in ten wives have heard of El Salam Canal, which is already functioning. In fact, more than half of wives haven't heard of any major irrigation scheme.

Husbands are also better informed about Water User Associations, although even they are not well informed. When asked whether Egypt would face scarcity of water in the future, around half of wives and a fifth of husbands reported that they do not know. More than one-third of wives and slightly fewer husbands felt that Egypt will not face any scarcity of water in the future.

Wives were asked about the advantages and problems of night irrigation and responses are presented in Table 9-3. The knowledge of advantages among husbands are higher than among wives. The main advantage of night irrigation, reduced losses from evaporation, was cited by far lower proportions of wives than their husbands.

**Table 9-2 Couples' Knowledge about Water Situation in Egypt**

Percent distribution of husbands and wives by knowledge of the national water situation, National Survey 2001.

Variable	Husband	Wives
<b>Main Source of Water in Egypt</b>		
Nile	98.4	85.9
Other answer	1.6	14.1
<b>Amount of Water for Egypt</b>		
Fixed quota	49.2	18.8
Variable quota	34.1	24.3
Don't know	16.7	42.5
<b>Can Egypt Negotiate a Higher Quota?</b>		
Yes	59.2	38.8
No	15.7	4.5
Don't know	25.1	42.4
<b>Number of Countries Sharing the Nile with Egypt</b>		
<9	65.5	32.7
9	3.0	1.1
10	3.6	0.9
11+	0.0	0.0
Don't Know	27.9	65.2
<b>Mean Number of Countries</b>	4.7	3.9
<b>Sector that Consumes Most Water</b>		
Agriculture	96.7	83.9
Households	2.2	11.4
Don't know	0.8	4.7
Industry	0.4	0.0
<b>Major Irrigation Projects (MR)</b>		
Toushka	78.8	39.4
El Salam Canal	33.3	8.4
East El Ewaynat	11.8	2.7
Don't know	15.1	55.7
<b>Knowledge of Water User Associations</b>	3.7	1.4
<b>Scarcity of Water in Future</b>		
Serious	21.2	6.7
Not Serious	18.2	6.7
No Problem	39.4	38.7
Don't Know	21.2	47.7
<b>Number of Husbands and Wives</b>	<b>509</b>	<b>509</b>



Table 9-3 shows also the problems of night irrigation. The perception here is relatively similar: about half of husbands and wives do not see any problem with night irrigation, while the leading problems that were mentioned concern the loss of sleep, and the difficulty of working in the dark.

<b>Table 9-3 Couples' Perceived Advantages and Disadvantages of Night Irrigation</b>		
Percent distribution of husbands and wives by perceived advantages and disadvantages of night irrigation, National Survey 2001.		
Variable	Husband	Wives
<b>Advantages of Night Irrigation (MR)</b>		
Land is cold/ plants don't fall down	62.0	37.3
The required water at night is less	41.0	24.9
Decreased evaporation	20.8	7.6
Fewer problems with other farmers	15.1	5.5
Other	13.9	34.9
<b>Disadvantages of Night Irrigation (MR)</b>		
No problem	51.0	42.7
Can't sleep well	24.3	30.4
Inability to see water	20.2	13.3
Humidity	16.5	18.4
Lack of workers	12.0	5.5
Fear of monsters and thieves	2.4	5.5
Other farmers steal water	1.8	0.6
Other	4.3	11.6
<b>Number of Husbands and Wives</b>	<b>509</b>	<b>509</b>

### 9.3 WIVES' ATTITUDES TOWARDS WATER RESOURCES

Farmers' wives were asked about their greatest concern regarding the future. Table 9-4 presents these responses. The findings indicate that wives almost have the same concerns as their husbands with some lower percentages. Their greatest concern is that water arrive at their fields at the right time, cited by 56 percent of husbands and 40 percent of wives. Equal proportions of husbands and wives were concerned about water quality – about 40 percent of each. Husbands were more concerned about the cost of irrigation than wives, but even for husbands, it was a minor worry.

Farmers' wives were also asked if they would accept their husbands participating in a WUA if one were formed nearby. The results presented in Table 9-4 indicate that wives' positive attitudes towards WUA are similar to their husbands': four-fifths of wives would accept that their husbands join a WUA. Husbands and wives did differ in their perception of the benefits a WUA would convey: wives saw the benefits accruing to the land as the leading benefit, where their husbands anticipated improvements in problem solving.

<b>Table 9-4 Couples' Attitude Towards the Future and Towards WUAs</b>		
Percentage distribution of husbands and wives by greatest concern about irrigation and attitudes towards WUAs, National Survey 2001.		
Variable	Husband	Wives
<b>Greatest Concern for the Future of Irrigation (MR)</b>		
Water doesn't arrive	55.9	40.0
Availability of enough clean water	41.2	39.8
Cost of irrigation water	10.6	3.7
Salinity of irrigation water	8.6	4.9
Low levels at the High Dam	6.1	2.7
Other	12.7	24.3
<b>Would Join if an Association Were Nearby</b>		
Yes	75.7	79.0
No	24.3	21.0
<b>Among those who said they would participate Reasons for Joining (MR)</b>		
Solve water problems	61.4	48.5
Benefit of land	56.0	64.9
Take care of <i>mesqa</i>	40.2	15.2
Benefit of farmer/farmers	39.9	40.5
Other	1.6	1.7
<b>Number of Husbands and Wives</b>	<b>509</b>	<b>509</b>

**Recommendation:** Pretest communication materials among farmers' wives to ensure that communication materials reach farmers' wives effectively.

## 9.4 WIFE'S ROLE IN AGRICULTURE AND IRRIGATION

Wives' involvement in agriculture and irrigation was investigated by asking whether the wife helps her husband in agriculture and if so, what are her tasks. These questions were directed for both farmers and wives. The results as presented in Table 9-5 indicate that similar proportions of farmers and their wives (51 percent) said that the wife helps in agriculture and irrigation. Among those who said that the wife does help, there was almost perfect agreement within couples as to her specific tasks. Slightly less than three-fourths said that wives help in rearing livestock, two-thirds said wives help in cultivation, and around one-tenth said that wives help in irrigation. The estimated mean number of hours a wife helps in agriculture and irrigation as reported by husbands and wives is also almost exactly the same, at around 18 hours per week.

**Table 9-5 Couples' Perceived Role of Wives in Agriculture and Irrigation**

Percentage distribution of husbands and wives by reported role of wives in irrigation and agriculture, National Survey 2001.

Variable	Husband	Wives
<b>Wife helps in agriculture and irrigation</b>	50.6	51.3
<i>Among those who say wife helps</i>		
<b>What role does she play (MR)</b>		
Rearing livestock	72.1	72.0
Helps in cultivation	66.7	67.8
Helps in irrigation	8.1	10.0
<i>Among those who say wife helps</i>		
Mean number of hours wife works per week	17.2	18.8
Wife helps in agriculture and irrigation	50.6	51.3
<b>Number of Husbands and Wives</b>	<b>509</b>	<b>509</b>

## 9.5 IRRIGATION PROBLEMS

### 9.5.1 Flow of Water

To assess farmers' wives awareness of the irrigation problems that farmers face, wives were asked a series of questions regarding flow of water in canals and *mesqas*, quality of water and drainage problems.

Table 9-6 presents findings concerning husbands' and wives' awareness about problems with the water rotation. Although 29 percent of wives do not know whether the water flows in the canal on schedule, the greatest percentage of wives said that it always does so, as did the greatest percentage of their husbands. Regarding the flow of water in the *mesqa*, a quarter of wives were unable to say whether it did flow on schedule or not, while as in the previous question, not one husband said he didn't know this important piece of information. There was general agreement about whether it always, usually, or sometimes flowed in the *mesqa* on schedule.

**Table 9-6 Couples' Perceived Likelihood of Water Flowing on Schedule in Canals and Mesqa**

Percent distribution of husbands and wives according to the likelihood of water flowing on schedule in canals and *mesqas*, National Survey 2001.

Variable	Husband	Wives
<b>Water Flow in Canal on Schedule?</b>		
Always	48.4	36.1
Usually	34.7	23.0
Sometimes	12.7	9.6
Rarely	3.5	1.8
Never	0.6	0.6
Don't Know	0.0	29.1
<b>Water Flow in Mesqa on Schedule?</b>		
Always	29.2	20.2
Usually	22.4	16.1
Sometimes	25.5	19.8
Rarely	15.3	10.6
Never	7.6	8.3
Don't Know	0.0	25.0
<b>Number of Husbands and Wives</b>	<b>509</b>	<b>509</b>

### 9.5.2 Quality of Water

Farmers' wives were asked about the quality of irrigation water, sources of its contamination and methods of preventing contamination. These results are presented in Table 9-7. There is a good deal of agreement between couples. They are almost evenly split in perceiving their *mesqa* to be contaminated or clean. In the couples' opinion, household waste water and soap residue constitute the greatest source for water contamination as mentioned by three-fourth of wives and similar percentage of their husbands. Throwing dead animals in canals or *mesqas* was mentioned by around half of farmers and 44 percent of their wives, while the industrial wastes were realized as pollutants by very low percentages of couples.

When asked how to prevent the contamination of water, slightly more than half of both wives and husbands mentioned cleaning the *mesqa*. As throwing garbage and dead animals in the water was considered one of the main sources of contamination, more than one third of wives and similar proportion of their husbands suggested fining those who throw these pollutants in the water channels.

**Table 9-7 Couples' Reports of Levels of Water**

**Pollution in Mesqa**

Percent distribution of husbands and wives by level of pollution in *mesqa*, source of pollution and method of treatment, National Survey 2001.

Variable	Husband Wives	
<b>Mesqa Status</b>		
Clean	49.8	57.2
Contaminated	50.2	42.8
<i>Among those whose mesqa is contaminated</i>		
<b>Source of Contamination (MR)</b>	75.4	74.3
Household wastewater, soap	51.6	44.0
Dead animals	25.0	24.8
Sewage	24.6	24.3
Bacteria (bilharzia and e-coli)	11.3	6.9
Pesticide and fertilizer residue	9.0	7.8
Drainage water	3.1	1.8
Industrial waste	75.4	74.3
<b>Methods of Preventing Contamination (MR)</b>		
Clean <i>mesqa</i>	55.7	53.3
Fine for throwing garbage/animals	37.8	38.0
Cover <i>mesqa</i>	24.7	19.8
Clean canal	16.7	9.8
Lay sewer line	8.2	5.3
Other	9.3	12.0
<b>Number of Husbands and Wives</b>	<b>509</b>	<b>509</b>

### 9.5.3 Consequences of Irrigation and Drainage Problems

Irrigation and drainage problems have consequences for land productivity and farm income. Husbands and wives demonstrated a great deal of agreement in their knowledge of these consequences. Table 9-8 indicates that wives were well aware of whether their husbands lost crops due to lack of water and whether they left land fallow due to inadequate water. Less than a third of wives reported that their husbands lost crops due to lack of water, confirmed by similar proportion of husbands. When asked if they left land fallow due to inadequate water, less than one tenth of couples responded that they did so. Wives were aware of when this occurred: 84 percent said in the summer, and 16 percent said in both summer and winter, almost perfectly matching their husbands' responses. Their knowledge of exactly how much land was left fallow, however, was not precise.

**Table 9-8 Couples' Reports of Consequences of Irrigation and Drainage Problems**

Percent distribution of husbands and wives by reported consequences of irrigation and drainage problems, National Survey 2001.

Variable	Husband Wives	
<b>Lost Crops Due to Lack of Water</b>	31.8	29.7
<b>Left Land Fallow Due to Inadequate Water</b>	9.8	8.8
<i>Among those who left land fallow</i>		
<b>When Was Land Left Fallow?</b>		
Summer	86.0	84.4
Summer & winter	14.0	15.6
<i>Among those who left land fallow</i>		
<b>Area Left Uncultivated</b>		
< 1	58.0	33.3
1 -2	24.0	2.2
3 +	18.0	64.4
<b>Mean</b>	2.30	8.07
<b>Number of Husbands and Wives</b>	<b>509</b>	<b>509</b>



## PRA FINDINGS

## 10

### 10.1 ORGANIZATION AND IMPLEMENTATION OF THE PRA STUDIES

The objectives of the Participatory Rural Appraisal (PRA) were to assess in a broad and in-depth manner farmers' behavior with respect to water management. The results of this qualitative work are intended to complement the results of the quantitative survey.

#### 10.1.1 Sample Design and Selection

The sample design called for one community to be selected from each of the five regions, two with WUAs and three without. Five directorates were selected purposively to meet these criteria: two directorates in IIP areas and three in non-IIP areas. On the first day of fieldwork in each community, the research met with the head of the Directorate. The team asked him to select a village with a population of around 6,000 – 15,000 in which the research could be carried out, and to permit the irrigation engineer for that village to work as a member of the research team. In addition to size, the other criteria for selecting the village were that a map of the village be available, and that the engineer for that village be personally acquainted with the village.

The sample of villages selected for the case studies was:

- With WUAs: Balaqtar village in Beheira governorate (West Delta), Kom El Mahras village in Minya governorate (Middle Egypt).
- Without WUAs: Tamalay village in Menoufia governorate (Middle Delta), Maymouna village in Sharqaiya governorate (East Delta), and Awlad Ibrahim village in Assuit governorate (Upper Egypt).

In each community the target was to collect information from a minimum of 80 community members. The 80 individuals were intended to represent both men and women, varying occupations, size of land ownership, educational level, and social status. A special effort was made to include female-headed households.

#### 10.1.2 Study Instruments

The PRA study used a set of ten tools:

1. Semi-structured interviews with individuals.
2. Focus group discussions.
3. In-depth interviews with key informants.
4. Collection of secondary materials available from official offices such as the village council, agricultural cooperative, etc.
5. Observation of ongoing activities.
6. Site visits.
7. Community mapping with community members.
8. Historical diagram of the community.
9. Venn diagram showing actors involved in the management of water resources as well as those involved in conflict resolution.
10. Ranking of problems, needs and preferences of community members.

A semi-structured interview guide was designed and developed to be used for the in-depth interviews and focus group discussions. The guide included the following topics:

- **Livelihood analysis:** age, gender, level of education, marital status, sources of income, household size, land holding, occupation and profession.

- **Community profile:** population, schools, associations, government services, gathering places for men and women, water resources, occupations, land tenure, and main problems related to water.
- **Gender division of labor:** agricultural processes and land preparation, animal husbandry, irrigation, household consumption, drainage, and non-farm activities (household-level, and village-level).
- **Management of water resources:** personnel / institutions (gender composition), complaint process, conflict solving process (history), decision-making process, and water users associations (composition and structure, including membership and role division, and processes including meetings and decision-making).
- **Mass Media:** television, radio, posters, and fliers as a source of information about water related issues. Types of media from which they would like to receive information about water usage.

### 10.1.3 Data Collection and Analysis

One interview team collected the data. The team was comprised of seven members: the PRA specialist, two men and two women hired from El-Zanaty & Associates for their experience in qualitative interviewing, plus two members hired from the community – one man and one woman. The community members were the district irrigation engineer and a community member: if the engineer was a woman, then the community member was a man, and vice versa. Hence the composition of each team was four women and three men.

The data collection involved five days in each community. The first day comprised orientation for the interview team: introducing the team to the methodology, and introducing the team to the village. During Day One, the engineer identified a woman to be the seventh team member. The eligibility criteria were that she had to be literate and available for the entire 5 days. Background data on the village were collected the first day. The team met in the evenings of Days One to Four and during Day Five to synthesize their notes, using flipcharts. The data collection of the five communities started on October 20, 2001 and was completed by the end of December 2001. A total of 58 focus groups and 222 in-depth interviews were carried out with a total of 422 individuals.

After the completion of data collection in each community, the PRA specialist prepared a case study with Venn diagrams and maps using the daily preliminary analysis (five case studies are included Appendix E). The key PRA findings are summarized in this chapter.

### 10.1.4 Background Characteristics

Most communities in the PRA study had health units, pharmacies, schools, and services, as shown in Table 10-1. The size of the communities varied from 6,600 to 40,500, and the agricultural area of the communities varied from 600 feddans to 7,400 feddans.

Table 10-2 provides an overview of the characteristics of the PRA participants. They were distributed across a wide age range, from 17-62+, although most participants were under age 62. Most participants were illiterate, with the exception of men in Maymouna, a number of whom were well educated. Around one in ten were single, while the majority were married. Table 10-3 provides the household characteristics of the PRA participants. While most participants came from households relying on agricultural income, a minority of households depended on income from private sector employment other than agriculture.

**Table 10-1 Characteristics of PRA Communities**

Number of health services, schools, and other services in each PRA community, PRA Study 2001.

	Balaqtar Beheira	Kom El Mahras Minya	Awlad Ibrahim Assuit	Tamalay Menoufia	Maymouna Sharqaiya
<b>Health Services</b>					
Hospitals	0	0	0	1	0
Health units	1	1	1	0	1
Pharmacies	6	1	1	3	0
Private Clinics	4	0	0	0	0
Veterinary Clinics	3	0	0	1	0
<b>Area and Population</b>					
Agricultural Area	7,396	4,675	874	2,200	600
Population	32,730	6,600	10,744	40,492	17,000
<b>Schools</b>					
Primary	2	0	2	3	1
Preparatory	0	0	0	0	1
Secondary	3	0	1	1	0
Religious	1	0	3	4	0
<b>Services</b>					
Police Station	1	0	0	1	0
Banks	0	0	0	1	1
Agricultural Coops	1	1	1	1	1
Workshops	5	4	1	9	3
Shops	25	1	15	31	10
<b>Social Centers/Units</b>					
Mosques	Not avail.	2	12	16	2
Churches	0	2	0	0	0

**Table 10-2 Individual Characteristics of PRA Participants**

Percent distribution of PRA participants by age, education, social status and community, PRA Study 2001.

	Tamalay		Balaqtar		Kom El Mahras		Awlad Ibrahim		Maymouna	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<b>Age</b>										
17-30	33	43	22	52	19	34	13	55	34	57
31-45	26	35	39	33	51	40	45	23	40	13
46-61	26	20	39	9	22	16	33	12	21	23
62+	15	2	0	0	8	10	9	10	5	7
<b>Education</b>										
Illiterate	64	81	37	65	57	91	82	69	27	67
Read and write	4	0	21	6	8	2	2	2	13	2
Primary	6	3	5	6	5	2	4	13	6	17
O level	8	0	26	23	25	5	12	16	49	14
University	18	16	11	0	6	0	0	0	5	0
<b>Social Status</b>										
Single	24	19	13	9	11	11	2	11	12	2
Married	76	76	87	76	89	75	98	76	88	80
Widow	0	5	0	15	0	14	0	13	0	18
<b>Number of individuals</b>	<b>39</b>	<b>46</b>	<b>38</b>	<b>34</b>	<b>37</b>	<b>34</b>	<b>54</b>	<b>45</b>	<b>47</b>	<b>48</b>

**Table 10-3 Household Characteristics of PRA Participants**

Percent distribution of PRA participants by main source of household income, size of household, land ownership, household facilities and community, PRA Study 2001.

	Tamalay	Balaqtar	Kom El Mahras	Awlad Ibrahim	Maymouna
<b>Main Source of Household Income</b>					
Agriculture	81	57	65	87	89
Public sector employment	15	18	6	5	6
Pension	4	3	6	0	3
Private sector employment	0	22	23	8	2
<b>Size of Household</b>					
1-5	30	* <sup>8</sup>	31	32	30
6-10	56	*	51	50	56
11-15	14	*	11	18	10
16+	0	*	7		4
<b>Land Ownership</b>					
Rent	21	26	42	84	13
Own	70	46	37	16	85
Landless	9	28	21	0	2
<b>Area of Land Rented or Owned</b>					
< Than 1 feddan	38	19	29	58	58
1-4 feddans	55	65	37	38	30
5-10 feddans	7	6	11	4	10
10+ feddans		10	2		
<b>Facilities</b>					
Electricity	99	100	100	100	98
Tap water	50	94	87	90	92
Septic tanks	76	100	90	92	55
Water pumps	25	6	8	8	64

## 10.2 RESULTS

Water management practices were investigated at the household level covering a variety of tasks. Initially, various agricultural processes were explored through interviews with men and women in each community; these concentrated on gender division of labor. Domestic use of water and use of water for animals were also investigated. The gender differentials related to these practices are presented in the following discussion.

### 10.2.1 Gender Division of Labor in Agriculture Process

The agricultural process in each of the communities comprises many stages including:

- Crop selection.
- Land preparation.
- Planting.
- Fertilizing.
- Weeding.
- Turning the water on.
- Supervising water in the field.
- Operating the pump.
- Turning the water off.
- Crop harvesting.
- Marketing products.

<sup>8</sup> A different categorization was used in Balaqtar: 74 percent of households had 1-4 members, 9 percent had 5-25 members, 11 percent had 26-36 members, and 6 percent had 37-46 members.



Clear divisions of labor were revealed by gender in both agriculture and irrigation. Female farmers' involvement varies according to the crop cultivated. Female farmers, for example, are heavily involved in the transplanting of rice and the harvesting of cotton, clover and wheat. On the other hand, planting peas is considered so complicated that it is only done by especially experience farmers. Female farmers in Sharqaiya (Maymouna village), for example, reported that they are not involved in the planting or irrigation of vegetables due to fears that vegetables are hypersensitive, and any mistake might reduce the yield. Female farmers are more involved in weeding, harvesting and marketing.

Male farmers usually apply chemical fertilizer, while female farmers usually apply manure on fields. Female farmers are never involved in operating or maintaining the pumps.

Men and women work as day laborers in all five communities. The only tasks day laborers do not perform is crop selection, buying seeds, and marketing, which is done by landowners. Labor exchange is more common among women than among men farmers.

In one community (i.e. Awlad Ibrahim in Assiut), participants were reluctant to acknowledge the role of women in agriculture, saying that women's involvement in the agricultural process is an indicator of a family's low socio-economic status. Women are also reluctant to acknowledge their role for fear of reflecting badly on their families. The few male farmers who acknowledged that their wives contribute to the agricultural process justified their wives' role by saying that living costs are higher today and that there is no shame in their wives working in agriculture.

The daily wage for women for any activity is roughly half that of men farmers. Male and female farmers justify the difference by saying that men work harder.

Some female farmers doubt their level of agricultural knowledge, and tend to refer agricultural questions to their male relatives.

One group of women farmers in an IIP area and responsible for managing their land, complained that male farmers somehow managed to receive water before them, because they felt that male farmers were favored by the pump operators, which led female farmers to have to irrigate their land after dark. Female farmers reported that they dislike irrigating at night: not only is it frightening, but their reputations may be at risk, especially for single women.

Even female farmers who are actively engaged in agriculture are not involved in managing water resources at the community level as the section on the community level will reveal.

### **10.2.2 Gender Division of Labor in Domestic Use of Water**

There are three basic chores related to domestic water management: fetching water, washing clothes and utensils, and then disposing of the used grey water. In all five communities, these three chores are considered to be female chores.

In rare cases *fetching water* can be practiced by men if a wife is ill or if water is not locally available. In such cases, men would never carry the water, as women would do. Rather, they would transport it on donkeys or in carts, or on their shoulders. In Balaqtar village in Beheira, men were found to be involved in the sale of water on donkey carts to households with no water. Men also fetch water for themselves inside the household when they use the hand-pump for drinking.

*Washing clothes or utensils* is usually done within the household as washing them on the canal is only practiced on special occasions when women do not have a heavy load of household tasks and thus more time. Washing dishes or utensils in the canal is considered an entertaining, socializing activity that enables women farmers to meet their neighbors.

Farmers reported to have been warned by MWRI staff against doing washing in the canal. In Balaqtar (Beheira) and Kom El Mahras (El Minya) for example, farmers avoided being seen doing

so during fieldwork as rumors had spread in the village that a delegation from the MWRI was present in the village. Farmers said that they alert each other very quickly every time the news spread about those visits.

Knowing that canal water might not be very safe for washing, farmers in Tamalay (Menoufia) mentioned that they use the canal water only for the first wash, but then rinse with water from the hand-pump.

*Disposing of wastewater* is an entirely female activity as it is considered a disgrace for a man to be seen doing so in public. Men avoid disposing of wastewater: neighbors might criticize them as being "hen-pecked." Even if the household has a septic tank, there seems to be a preference among women to throw used water in the streets around the house during summer time. The intense heat is said to evaporate water very quickly, thus saving the household from the expense of emptying the septic tank. Farmers living close to the fields throw their wastewater on the land. The village council in Kom El Mahras which introduced a sewage system to households, was reported to have warned residents against filling their septic tanks too quickly. Thus farmers are advised to throw wastewater in the streets. The canal is also a favored place in which to dispose the wastewater. The village of Maymouna in Sharqaiya proved to be the only village where most farmers did not throw their wastewater in the streets even during summer time.

### 10.2.3 Gender Division of Labor in Use of Water for Animals

Giving animals water and bathing them is largely female activity. Care for large animals, e.g. buffaloes and cows, are a shared responsibility by both male and female farmers of the household. In village Awlad Ibrahim in Assiut, female farmers provide animals with water if they are in the vicinity of the house, while males do so in the field. Because tap water is expensive, the practice of watering animals with tap water varies a great deal. Generally, farmers who have poor quality groundwater in their area water their animals with tap water, e.g. Awlad Ibrahim (Assiut) and Kom El Mahras (El Minya) and Balaqtar (Beheira). Farmers who do not provide their animals with tap water despite their awareness that groundwater is not safe, do so in order to minimize the costs of the tap water for which they have to pay monthly. In other places where tap water is said to be unsafe (e.g. Tamalay (Menoufia) and Maymouna (Sharqaiya)), water from the hand pump is used. The water resulting from bread dough preparation is said to be very nutritious for animals and hence offered for them to drink.

*Bathing animals* is performed by both male and female members of the household either in the canal or at home using groundwater (e.g. Tamalay (Menoufia)). The idea that cows, unlike buffaloes, do not need to be bathed is a prevailing notion among farmers in Maymouna village (Sharqaiya) and Kom El Mahras (El Minya). During summer, buffaloes are left on their own in the canal so as to cool down in the intense heat of the day. Women farmers are also involved in bathing the animals and also in the canal. Buffaloes are said to be very sensitive animals and would refuse to bath in the canal if unclean or refuse to drink from the same pot if another animal had drunk before.

### 10.2.4 Water Management at Community level

Within the traditional irrigation scheme there are various informal types of cooperation among farmers to organize water resources. In Tamalay (Menoufia) a traditional and informal water management organization was found to exist among a group of 10 farmers using the water wheel (*sakia*) as their main means of irrigation. The ownership of the *sakia* is a collective one, where no one assumes sole responsibility. Anyone who intends to use it should only inform the others about the time of usage. In case the *sakia* breaks, the one who is in the greatest hurry to use it assumes the responsibility and collects the money from the other households to repair it. A group of farmers meets occasionally to discuss a variety of issues related to operating the *sakia*. However, only men farmers attend those meetings and then inform women farmers in their *sakia* group, regarding decisions taken at the meeting.

In Awlad Ibrahim (Assiut) other forms of informal groups among farmers are found, mainly to organize irrigation. The simplest form is the collective ownership of mobile pumps, whereby each farmer is assessed a fee according to his land size. Another form is to own a pump collectively and then hire a machine operator, who is paid a salary by the group. Most of the villagers are involved in such arrangements and thus it is expected that the introduction of formal Water User Associations under an IIP model, will be easily readily by most villagers.

In Maymouna village (Sharqaiya) numerous village community management schemes were observed. In one instance a large number of farmers joined together to substitute the traditional irrigation wheel with a siphon to irrigate from the drainage canal. To do this, they collect money to cover the costs of the technician as well as the expenses. The other example is one of installation of the local sewage system for the village. All households interested in sewage pipes into their houses were asked to pay the fees of LE 250. Another example of community water management can be seen by farmers who decide that the *mesqa* needs cleaning other than the one performed routinely by the agricultural cooperative. Such endeavors are accomplished through individual efforts of some of the elder or larger farmers, who pass by the other farmers in their houses introducing the idea to them and then later collect financial contributions.

The organization of such efforts is an entirely male activity. Women in general are excluded from any form of community management or involvement in local politics. This statement holds true even in IIP areas with WUAs. Even if women have land in their names, they are not expected to attend any of the meetings, but rather be represented by one of their male family members. In the two cases studied where WUAs had been formed, namely in Kom El Mahras (El Minya) and Balaqtar (Beheira), only one female farmer in the case of Balaqtar (Beheira) was found to be an active member in a WUA. This is due to the fact that this female farmer is the head of household, has no male representative in her family, her children are still young, and she manages the land by herself.

In the two IIP areas female farmers were asked about the associations existing in their village and around the *mesqa* they irrigate their lands from. They were not aware of any of the issues pertaining to the management of water resources at the community level. In very few cases, they knew one of the WUA members, or they could guess the selection criteria for the head of the WUA. However, such women farmers were able to respond only to some related issues like, the costs for the machine usage for irrigation, the name of the irrigation extension staff, problems they face in irrigating their lands etc.

Men farmers as well were often not aware about the official existence of such associations. In Kom El Mahras (El Minya), setting up such associations was very difficult and thus it happened that farmers were chosen as the head of *mesqas* even if their lands are not located on it, because none of the farmers with land on the *mesqa* was willing to take on the job. Farmers as well knew nothing about the meetings since in most cases none were held at all. More educated men farmers were aware about those associations than others.

### 10.2.5 Problems and Needs Related to Water Management

PRA participants reported a number of problems related to water management.

*Poor water management practices* were found throughout the five case studies, on the part of the villagers, some of whom throw garbage, dead animals and used water into the canal thus polluting it, as well as, blocking its flow. Farmers attributed part of the responsibility for this to lack of control on the part of authorities who failed to provide the proper awareness training, as well as, policing measures for misuse.

*Shortage of water*, especially in the summer time was cited by farmers in all five communities. This problem sometimes occurs to farmers based their location along the canal. Shortage of water forces farmers to irrigate their land using groundwater or drainage water which as mentioned, is too costly and risky. It is also a physical problem as people need to go several times to fill the

hose and clean the strainer (Kom El Mahras, El Minya). In addition, this is associated with many risks health, and anxiety caused due to snakes in the drainage water (Maymouna, Sharqaiya). In addition, drainage water increases salinity of the land and hence destroys the soil. Shortage of water results as well in many disputes among farmers, which would have normally not taken place.

*Lack of maintenance* on the part of the irrigation authority leads to the quick and uncontrollable spread of water hyacinth and other intrusive weeds.

*Lack of drainage* increases the salinity of the land, and lack of sewage systems in the households compels inhabitants to throw their wastewater in the canal or the streets. (Tamalay (Menoufia), Awlad Ibrahim (Assiut)).

*Problems with local directorate staff.* Farmers complained about the delay of response from the districts and directorate staff. This is in part due to a lack of coordination between the irrigation and the drainage departments, which ends to the farmer's disadvantage. A sense of misuse of power is also severely felt by farmers, where the pump operator controls the opening of the flow of water in the canal (Kom El Mahras (El Minya), Maymouna (Sharqaiya)). Farmers also complain of bad treatment from the local directorate staff.

*Uneven construction of mesqas* was one of the complaints that were reported by farmers from the IIP areas. This from their point of view leads to the impediment of the water flow as well as the ruin of the old *mesqas* handed over, and their need for refurbishment. In Balaqtar, the level at the beginning of the *mesqa* is lower than its end, and in Kom El Mahras, the pipe lies too deep in the canal thus allowing the mud to enter the pipe and leading to the blockage of the water flow. In these two cases regular maintenance does not take place.

*Low quality of drinking water* was a problem mentioned by farmers (Tamalay (Menoufia), Awlad Ibrahim (Assiut)), at the same time there is a frequent interruption of potable water supply.

Accordingly, the reported needs of the farmers revolved around the problems they cited: frequent cleaning of the canal, and the drainage from weeds and waste, and renovation and introduction of agricultural drainage canals were mentioned by farmers as their main needs. Other needs mentioned were: introducing measures of control as well as paving the two sides of the canal so as to stop farmers from throwing their waste into the water, and introduction of improved irrigation schemes such as IIP or IMT.

Introduction of agricultural drainage systems (Maymouna), and introduction of maintenance centers for irrigation machinery (Kom El Mahras, Balaqtar) were also cited by farmers as necessary. Covering of drainage canals especially in inhabited areas, the introduction of sewage system in the households, (a need especially mentioned by women being the prime managers of water on the household level) were also cited (Tamalay, Balaqtar, Maymouna). Supporting the provision of continuous flow of clean drinking water is a need especially noted by female village inhabitants who have to carry potable water over long distances.

#### **10.2.6 Actors Involved in Water Management**

Several major actors are known among villagers as playing a significant role in the water management process related to irrigation. Some of these actors are from inside the village and the rest are from the concerned governmental department in the directorate outside the village. The main actors inside the village are: the villagers or farmers (as the land owners and users of water), the local Agricultural Cooperative (responsible for cleaning the private *mesqa*), the machine owner, the machine operator or technician, and the *Bahar* (who opens the water in the *mesqa*). In addition to the cases of IIP areas, the board of the WUAs especially the head of the *mesqa* as in the case of Kom El Mahras (El Minya) or Balaqtar (Beheira) was found to be among the principal actors.

Main actors from outside the village include: the irrigation officer from the local irrigation department, the concerned irrigation department, the irrigation department inspectorate, the drainage department, as well as the contractor hired for cleaning the canal.

### 10.2.7 Local Water Conflict Management

**Issues of conflict** were explored in the discussion with farmers and they were found to vary according to the pattern of irrigation. In the traditional irrigation scheme, conflicts arise when one farmer jumps his turn in the supply queue, or interrupts the water flow to his neighbors.

In IIP areas conflicts often arise over disagreements regarding the fees to be paid in the WUA. The pump operator can then be told by the head of the *mesqa* not to allow the farmer to irrigate.

In general, conflicts arise more frequently during times of water scarcity, which usually happens in summer. In a few instances conflicts may arise between farmers, and an authority responsible for water management probably due to lack of responsiveness toward farmers' concerns. In such cases farmers send telegrams to the concerned ministries, as in the case of Tamalay (Menoufia) when farmers sent out telegrams to the Ministry of Health and the Ministry of Environment. In Maymouna (Sharqaiya) villagers send out telegrams to the Minister of Irrigation and the Prime Minister to increase the water delivery allocation. Farmers often assemble a small delegation which then goes to the concerned Irrigation Department to present the problem of the village or they ask the alternating representative from the local council to present the case to the Department (as Maymouna (Sharqaiya) and Tamalay (Menoufia)).

The **involved actors** can be grouped into those from inside as well as those from outside the villages. Those from inside the village include village traditional committee, the village elders, the Mayor "Omda", the *Bahar*, the Agricultural Cooperative, the local council, and chairman of WUAs (in IIP areas). External actors from outside the community were identified to be District Engineer, Irrigation Advisory Service (IAS) engineer, the Irrigation Directorate in the governorate capital and the police station.

Among all cases reported, farmers were found to be eager to solve their disputes amicably, with the parties attempting to settle them. If they cannot reach a consensus the first step is to resort to an informal village committee, which is the traditional way of solving all disputes among people of one clan. Preferably the committee should consist of three male persons; there can be a consensus among a majority. Often this committee includes the village elders. This committee can gather in the field right where the dispute has arisen (Maymouna village Sharqaiya). Sometimes farmers report the case to the village Mayor. The two parties go together or they go independently and then the mayor calls the other party independently. Whether farmers opt to go to the mayor depends very much on the character as well as the interest of the mayor. In Kom El Mahras farmers always go to the mayor. Farmers then meet in his guesthouse and then unanimously accept all his suggestions. In some cases farmers ask the agricultural cooperative to intervene or go to the representative in the local council (Tamalay, Menoufia). If the case becomes too complicated farmers then refer to the appropriate Irrigation department officer. The latter in turn contacts the police station in order to intervene and to charge the accused person.

Which procedure is followed depends very much on the complexity of the problem, the resilience of the person accused as well as the entire village context. In general, farmers are very reluctant to report other farmers to the police. They would rather wait until the irrigation district engineer comes on his regular visit to the village, so that he can see the violation and take action (Tamaly, Menoufia). In Kom El Mahras, for example, farmers' actions are based on the prevailing political climate as well as village traditions. Because of the political restlessness caused in Upper Egypt over the last few years by the religious fundamentalists, villages there have experienced nighttime curfews. In some instances, a curfew was officially declared and in others farmers feared police shooting. Among the villagers in Upper Egypt, rivalry is said to take place and continues for generations when the case cannot be settled. Thus, farmers are reluctant to refer to the police or to

resort to violence with each other lest it erupt into wider conflicts. Given all these conditions, farmers reported they rather prefer to accept the circumstances and not report or complain about “little” disputes.

Female farmers rarely get involved directly in conflicts. However, they are informed about conflicts and generally accept the collective decision, as in the case of Maymouna village when the whole village agreed not to pay the water bill as a protest for frequent supply interruption. In a case in Kom El Mahras a female farmer mentioned that she knows how to ask an educated man to write out an official complaint so that she can lodge it. However, she does not like to get into conflicts with anybody from her village, or to contact any of the local institutions over such issues.

#### **10.2.8 Use of Media by Farmers**

Four means of media transmission were discussed with male and female villagers in terms of preference for receiving information on water management issues. The four means of media discussed were television, meetings with extension officers, radio, printed brochures and posters.

The discussions showed that the preferred sources of information about water management were television and meeting with extension officers. In three cases, television was found to be unanimously preferred among female and male farmers. In the case of Tamalay-Menoufia both male and female farmers opted for television as rank two, favoring the extension officers instead. In the case of Kom El Mahras only male farmers preferred television as the main source of information, while meetings with the extension officers were ranked highest among female farmers.

Radio and brochures were also ranked as third and fourth respectively with radio being left out altogether by males and women in some instances (Tamaly and by female farmers in Kom El Mahras (El Minya)). Brochures were also left out in some cases as in Kom El Mahras by female farmers.

The reasons cited most often for preferring TV were that it is easy accessible, widespread, relevant, addresses all age groups, as well as level of education, and TV operates throughout the day.

Meetings with extension officers were also preferred because, they provide an opportunity for farmers to pose practical questions, and allow for discussion, and interaction. Thus, it allows for direct practical presentation of the issues of concern. This explanation was offered mostly by female farmers (Awlad Ibrahim, Assiut). Meetings with extension officers was ranked in the middle, because they can make themselves easily understood by farmers.

Radio received lower ranking as few radio sets are owned by farmers. However, radio was mentioned because it can be used during electricity downtimes and is portable. Therefore farmers can listen to it in their fields. Radio was most often mentioned by male farmers.

Brochures are moderately useful as a medium because they at least provide illustrations. Brochures also were ranked very low by farmers in the five cases due to the difficulty of illiterate farmers working with written material. Farmers can thus only look at the pictures, and not be able to read the texts provided, hence messages do not reach the target groups. This was especially true for women farmers, among whom illiteracy is higher than among men.

Farmers expressed the need to arrange the visits of the extension officers during daytime in the fields. Female farmers did not seem to be bothered by the gender of the extension officers; they indicated they appreciate any extension officer's visit to the community. When extension officers want to meet female villagers in their home, they usually all meet at a single location in the village.

The preferred time mentioned by farmers for watching TV is after sunset, as work in the fields would have been finished by then. They also do not watch it very late, as they are early sleepers. Another useful time for broadcast is after the Friday prayers. Farmers also mentioned that they enjoy information which comes via TV dramas, as they are likely to associate themselves with the characters in these dramatic presentations.

One male farmer in Kom El Mahras suggested using newspaper and magazines as possible means of communicating with farmers, although recognizing there is limited circulation.

Farmers also expressed interest in receiving information about: the best times for irrigation, methods of crop planting, new cropping plants, symptoms of agricultural plight and means of combating, and hazards of chemicals.





## CONCLUSION AND RECOMMENDATIONS

## 11

The Ministry of Water Resources and Irrigation (MWRI) is working to address a problem that is being faced in a number of sectors in Egypt: growing demand for an increasingly scarce resource. Population and industrial growth are increasing demand for water, yet the amount of water available to Egypt is fixed. One major component of the solution is to bring demand into line with supply by moderating the level of demand, mainly by increasing the efficiency of water use in irrigation. To implement this long-term policy change, the MWRI is working in a number of different areas, including increased farmer participation in decision-making. To increase participation, MWRI is undertaking a number of efforts to communicate to the farmer. These include for example: information about new crops, new irrigation methods, and new water management opportunities. The Ministry's work in raising awareness among farmers about the need to manage water more efficiently and in engaging farmer participation in decision making about water have a number of different programmatic elements, many of which are supported by communication activities. These activities inform farmers about policy changes, such as the establishment of Water User Associations (WUAs) or the promotion of lesser water consuming crop varieties, and aim to change farmers' knowledge and attitudes so that in the long term, on-farm water management will become more efficient.

Accordingly, a survey was conducted in 1998 to measure the level of knowledge, attitude, and practices (KAP) among Egyptian farmers. A survey was again conducted in 2001 to monitor the change over time in KAP of Egyptian farmers.

The main survey findings are summarized in the following, in addition to some recommendations for improving KAP of farmers.

### 11.1 MONITORING TRENDS IN KNOWLEDGE, ATTITUDES, AND PRACTICES

The survey data provide the MWRI with the opportunity to monitor a wide variety of indicators of farmers' knowledge, attitudes, and practices towards water resources, which are summarized early in this report. These indicators provide MWRI with the information needed to guide and modify the development of policies and programs.

#### Knowledge

The data show significant increases on almost all knowledge indicators: e.g. knowledge of national water issues, on-farm water management, and the national rice policy. Virtually all farmers know that the Nile is the main source of water, and that agriculture consumes the greatest amount of water. Three-quarters of farmers have now heard of the Tushka scheme, compared to only half in 1998. The proportion that has heard of El Salaam Canal has now increased, but remains low, at only one-third of respondents. The proportion knowing that Egypt could suffer in the future from a lack of water has increased significantly, but remains at less than half of farmers, at 43 percent.

The proportion knowing at least one way they could use less water to irrigate has increased from 20 percent to 64 percent, which is a significant accomplishment. The proportion having heard of WUAs has increased significantly, from 3 percent to 6 percent, but remains a minority of farmers.

Regarding rice policy, almost all farmers now know that rice consumes more water than other crops, while most farmers also know that MWRI limits its cultivation precisely because of its high water requirement. Among rice farmers, the proportion who have ever heard of a short-duration variety of rice has increased from 63 percent to 93 percent, and the proportion that can correctly name a variety of short-duration rice has increased from 45 percent to 77 percent.

### Recommendations

- Inform farmers about new mega projects, the likelihood of water scarcity in the future, the number of countries who share the Nile, the fixed nature of Egypt's water allocation, and that Egypt would probably not be able to negotiate a higher water allocation.
- Inform farmers about WUAs at *mesqa* and branch canal that are being formed, about ways to use less water for irrigation, laser land leveling, and the advantages of night irrigation.
- Inform farmers about the advantages of private sector management over their water resources, and the benefits of the resulting flexibility.

### Attitudes

The data suggest that farmers are more amenable to taking on an increased role in the management of irrigation. They are significantly more willing to share in the costs of upgrading the irrigation and drainage systems, and among those who would join a WUA, there is a significant increase in understanding that the *mesqa* will be better maintained by a WUA.

Men farmers in both the Nile valley and groundwater areas are aware that there would be both advantages and disadvantages to having an increased role in water management. For *mesqa* management, the farmers see benefits outweighing disadvantages. Farmers in East Delta appear to be the most amenable to an increased role in *mesqa* maintenance. The benefits all farmers anticipate from an increased role in *mesqa* management are: cleaning the *mesqa*, organizing water delivery better, and resolving complaints. These benefits outweigh the disadvantage of the effort it would take. For branch canal management, the results are more equivocal than for *mesqa* management. Benefits were perceived to outweigh disadvantages in all regions except Middle Delta and Upper Egypt, but by smaller margins than for *mesqa* management.

In 2001, farmers' attitudes towards water were heavily influenced by the fact that due to floods in Sudan in 2001, more water was available than usual. The data reflect more positive attitudes among farmers towards MWRI. Fewer farmers feel the need to discuss their need for more water. The proportion of farmers who would speak to a senior official about drainage problems has increased significantly, as has their concern about water pollution, the cost of irrigation, the availability of enough clean water, and the salinity of irrigation water.

One area which MWRI may care to address is the farmers' perception regarding the Ministry. Certainly providing water from the Aswan High Dam to 7.5 million farmers in the Nile Valley is a difficult job, but farmers do not appear to understand this. Compared to 1998, the proportion of farmers who feel that MWRI has a relatively easy job and should be doing it better has increased. This certainly could be addressed as a set of communication message.

### Recommendations

- Promote an increased role for farmers in *mesqa* and branch canal management, explicitly mentioning the benefits of keeping the system clean, organizing water delivery better, and resolving complaints. Demonstrate how the benefits outweigh the costs in terms of time and effort.
- Communication materials about MWRI need to balance messages about the success of the Ministry's work with the difficulty of the tasks it is undertaking. Continue to promote *mesqa* and branch canal WUAs, showing how farmers can take an active role in addressing their greatest concerns about irrigation – water arriving on rotation, and the availability of an adequate supply of clean water.
- Demonstrate to farmers that WUAs are a good way to maintain the irrigation infrastructure and drains and prevent waste from blocking the flow of water.
- Explain to farmers that by law, cleaning the *mesqa* is their responsibility, and that the most efficient way to do it is through a WUA.

- Convince farmers of how difficult it is to bring the right amount of water from Lake Nasser to each farmer, and convince farmers that MWRI is working hard to do so.
- As a mean to improve services and overall system efficiency, management transfer and privatization need to feature prominently in all messages to farmers.
- Re-develop materials on changing farmers' attitude toward cost sharing of operation and maintenance and cost recovery of improvements.

### Practices

Due to the availability of more water in 2001, the mean number of summer and winter irrigations per farmer has increased significantly since 1998. Given that, the proportion of irrigations at night has remained steady. The proportion of farmers leveling their land did decrease by a small amount, but the proportion of farmers leveling by laser increased significantly, from 4 percent in 1998 to 10 percent in 2001. Most importantly, the survey data show a significant increase in the proportion of rice farmers who grew a short-duration variety of rice: 65 percent in 2001 compared to 29 percent in 1998. While the main criterion for crop selection continues to be household usage, the importance of economic factors increased. Market price was cited by 27 percent of farmers as a factor in crop selection in 1998, and by 38 percent in 2001, while cost of agricultural inputs was cited by 4 percent of farmers in 1998 and 11 percent in 2001.

The proportion of farmers who said they had enough water in the *mesqa* for summer irrigation increased significantly, to 29 percent, and in the winter it increased to 81 percent. Due to the abundant water available in 2001, the proportion of farmers who reported lost crops due to a lack of water dropped significantly, from 57 percent to 32 percent. The proportion of farmers who left land fallow did not change between 1998 and 2001, but the mean area left fallow among those who did so increased significantly, from 1.2 feddans to 1.8 feddans.

Since the survey sample did not contain any *mesqas* on which WUAs had been formed, the survey data do not tell us whether farmers have taken on new decision-making tasks related to water management.

### Recommendations

- Inform farmers that as they seek advice in crop selection, the irrigation engineer has information about the water required to help them in their decision making.
- If the KAP survey is repeated, plan the dates of fieldwork to facilitate comparison with previous years' data. In addition, the sample should include farmers on *mesqas* and branch canals with WUAs, to learn more about the knowledge, attitudes, and practices of farmers with a greater direct role in water management.

## 11.2 COMMUNICATION FROM FARMERS TO MINISTRY

The survey represents an opportunity for farmers to convey their problems to MWRI, and these have been documented here. Half of the farmers in the Nile valley reported that there was not enough water in the *mesqa* last summer, and a quarter of farmers reported that their biggest irrigation problem in the summer was that the water did not arrive on rotation. Farmers whose *mesqa* is at the tail end of the canal suffered from a lack of water more than those at the head end: 65 percent of farmers at the tail of the canal didn't have enough water in their *mesqa* in the summer, compared to 41 percent of farmers at the head of the canal.

Around seven in ten farmers in the Nile valley report they have the correct information about the official rotation on their canal, although only 38 percent of farmers in the East Delta knew this information. Approximately two-thirds of farmers said that the actual rotation matched the official rotation – therefore one-third of farmers experience canal rotation that does not match the official rotation.

Thirteen percent of farmers said that their branch canal is often or usually blocked by solid waste, and 21 percent said their *mesqa* was often or usually blocked. Regional differences are greatest for the *mesqa*: 41 percent of farmers in Middle Delta said their *mesqas* were often or usually blocked by waste. Farmers at the tail of a canal are more likely to experience branch canal, *mesqa*, and drain blockages than those at the head.

Half of the farmers reported that the water in their *mesqa* was polluted, mainly with household wastewater, dead animals, and sewage. The percentage of farmers reporting sewage as a source of pollution was highest in West and East Delta (77 and 58 percent respectively). Farmers acknowledge that the best way to prevent *mesqas* becoming polluted is to clean them, and 77 percent of farmers recognized that it is farmers' responsibility to do so.

Finally, a third of farmers report a problem with soil salinity, varying from 14 percent in Upper Egypt to 49 percent in East Delta. A third of farmers reported lower than expected yields due to lack of water in the year before the survey. Less than 10 percent of farmers left land fallow due to lack of water.

### Recommendations

- For better matching of irrigation delivery with crop water requirement, the MWRI Water Communication Unit (WCU) needs to have materials that draw farmers attention and interest.
- MWRI should have comprehensive communication program to inform farmers about the best times to irrigate and to plant their crops, and about new types of crops.
- An effort to increase collaboration between farmers and irrigation engineers, particularly in East Delta, need to be made. In addition, MWRI should investigate ways to improve farmers' satisfaction with district irrigation engineers especially in Middle Delta.
- Special training programs are needed for district irrigation engineers to improve communication with farmers.

### 11.3 MWRI COMMUNICATION ACTIVITIES

The data provide an opportunity to review the general impact of the MWRI communication efforts – mass media and print materials – at reaching their target population, and they also suggest ways to modify the design of future communication activities (listed under Recommendations, below).

The TV apparent by spots made a lasting impression, considering that 18 months had elapsed since they were last aired. Four in ten men farmers reported that they had ever seen any of the seven TV spots. The best recalled spots were those on water pollution, rational water use, the new projects, and the water problem in Egypt. Three in ten men reported that they had seen any of the five informational TV programs. The best recalled programs were those about laser leveling, maintaining canals, and rationalizing water use.

Print materials were primarily distributed through MWRI channels to the *handasa*, and engineers may have distributed posters to agricultural cooperatives and schools. Twelve percent of farmers reported that they had seen at least one poster. Among farmers who saw a poster, the most often place to see a poster was the *handasa* (67 percent), the agricultural cooperative (20 percent), or a school (9 percent). Given that thirteen percent of farmers visited their irrigation engineer last year, these figures seem to suggest that farmers did see posters when they visited locations to which posters had been distributed.

Brochures were distributed by MWRI to the *handasa*, and from there some engineers may have distributed them to agricultural cooperatives. Brochures, however, were a less successful method for reaching farmers: they are more difficult to distribute and more difficult to use. Unlike posters, which generally require no explanation and are usually not handed out, brochures require

explanation since they generally contain a good deal more text than posters, and just over half of farmers have never attended school. Consequently, it is not surprising that only 35 men farmers of the 1,980 interviewed in the Nile valley had seen a flier. Those who saw a flier reported that they had seen it at the *handasa* or the agricultural cooperative. Between the five brochures, 20-30 percent of respondents who saw the brochures reported that someone had explained it to them.

Communication activities were generally less effective at reaching women farmers than men farmers. Twenty-two percent of women farmers reported seeing any TV spot, compared to 44 percent of men; 5 percent of women said they saw any TV program, compared to 27 percent of men; and 1 percent of women saw a poster compared to 12 percent of men. Certainly the lower exposure to posters is linked with the fact that women rarely visit their *handasa*.

There were significant regional differences in exposure to these activities. Farmers in East Delta were more likely to have seen a spot (55 percent compared to 44 percent in the Nile valley), and the mean number of spots seen (1.9 spots) was double the average for the Nile valley (1.1). Farmers in East Delta were also more likely to have seen a TV program (54 percent compared to 27 percent in the Nile valley), and to have seen more of them (the mean number of programs seen was 1.7 compared to 0.7 in the Nile valley).

The data do paint a picture of the level of communications between farmers and MWRI. About one in ten farmers typically visit their irrigation engineer per year, usually in the summer. Farmers in East Delta and Middle Delta are most likely to do so: 27 and 20 percent respectively visited their irrigation engineer at least once last year. Farmers' level of satisfaction with the visits reflects the overall level of irrigation problems facing farmers in each region: farmers in Middle Delta and East Delta are least likely to say that the irrigation engineer responded to their needs.

Farmers described themselves as very interested in having irrigation engineers ask farmers for their opinions on matters such as branch canal operation, scheduling cleaning, the rotation, garbage in canals, and illegal outtakes, although only in East Delta has the irrigation engineer ever asked farmers about these topics. In East Delta, about 10 percent of farmers said the irrigation engineer had asked their opinion.

The data suggest that irrigation engineers in East Delta make an effort to be responsive. In the Nile valley, the mean number of times farmers saw irrigation engineers in the field was 1.2 times; in East Delta, is 2.5 times.

Most farmers have never spoken with the drainage engineer – only 6 percent of farmers in the Nile valley reported doing so. Farmers in groundwater areas were significantly more likely to have done so – 33 percent reported ever speaking with him. Eleven percent of farmers had ever spoken with the *hood* observer about the crops they intend to plant, with the highest proportion in East Delta, at 43 percent.

Much of the farmer-initiated communication with MWRI at all levels concerns complaints. Eighteen percent of farmers have ever lodged a complaint at any level of the Ministry (*handasa*, directorate, or at the central level, in Cairo). Farmers were generally dissatisfied with the result of the complaints process, regardless at what level they lodged the complaint. This may not be surprising, since when asked what topic they would like to discuss with the Ministry, 59 percent of farmers said "More water," and the Ministry is not usually able to provide farmers with more water. A further quarter of farmers would like to discuss cleaning the canal and drainage problems.

The data show significant increases in the proportion of men farmers who saw TV spots about conservation and pollution of irrigation water, the proportion who met with their irrigation engineer last year, the proportion who know the correct name of their irrigation engineer, and the proportion who sought advice in crop selection. The mean number of times the farmer met with the engineer remained essentially unchanged, as did the proportion of farmers who have information they need about new crops to try.

### **Recommendations**

- Evaluate MWRI communication activities through re-airing and monitoring TV spots over an extended period.
- Significant changes in materials distribution are needed specially for printed materials for school children, cassettes, and brochures to ensure broader coverage.
- Communication materials using popular film stars and singers to attract audience to messages should be considered.
- Children's materials on water management using images to draw their attentions ,e.g. "Bakar" or "Mickey Mouse" should be considered.
- Special materials need to be developed for illiterate farmers concerning water scarcity.
- Pretest communication materials among farmers' wives to ensure that communication materials reach farmers' wives effectively.
- Pretest poster layouts with more and less text to determine which results in greater understanding of the main message.
- Pretest all materials among both men and women farmers, who have different levels of knowledge and attitudes.

### **11.4 POLICY IMPLICATIONS**

A high percentage of farmers indicated a desire to be included in the decision-making process regarding canal operation and maintenance activities. Likewise, a high percentage indicated a willingness to participate in WUAs and to share the cost of upgrading the irrigation and drainage systems in their local area. It appears therefore that conditions are conducive to expanding and accelerating the transfer of O&M at the branch canal level with future consolidation to the District level. MWRI should evaluate the survey responses related to transfer in more detail, consider conducting additional limited surveys designed to assess attitudes toward transfer specifically, and adjust present policies related to transfer based on the results.

## APPENDIX A - SURVEY STAFF

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## APPENDIX B – SELECTED SAMPLE OF CANALS

### Upper Egypt:

Directorate	Inspectorate	District	Canal
Assuit	Bahry Assuit	Manflot	El Westania
			El Atamna Fara 4
			El Hwatka
		El Qoseia	El Saraqna
			Boq
			Balot
Qena	Qanater Esna	Deshna	Abo Manaa
			El Sayad
			Fara Ganabyt El-Seka El-Hadid
		Nagh Hmady	El Shikh
			El Kom El Ahmar
			Sayalet El Arbain

### Middle Egypt:

Directorate	Inspectorate	District	Canal
Fayoum	West Fayoum	Itsa	Fathet El Softa El Gedida
			Fathet Bahr El Nwara
			Fathet Ahmed El Basel
		Qota	Fathet Shalan El Bahrya
			Fathet El Kharaba(Karm)
			Fathet Abaza El Sharkeya
East El Minya	Bahry El Minya	Matay	Abo Essa
			Abo Haseba
			El Arab El Gedida
		East Samalot	Fara El Dosuk El Gharby
			Fara 3 Sefsafa
			Waslet Fara 4 Sefsafa
West El Minya	West El Yosefy	Manshat El Dahab	Rahel
			El Ganabia El Talta
			Serir
		El Edwa	El Hareka
			Kafr Abd El Khalek
			El Helfaya

### East Delta:

Directorate	Inspectorate	District	Canal
Sharqaiya	Bahry Sharqaiya	Kafr Sakr	Selim Ezat
			Ganabia 1
			El Hagarsa
		El Heseinya	San El- Samana
			Sami
			El Gandl El Sofly
Damietta	El Salam Canal	San El Hagar	El Seaidy
			Teraat Secand Stage

			Teraat Third Stage
	El Salheya	North El Heseinya	El Salheya
			El Heseinya Faraa El Kefah
			El Heseinya
East Dakahlia	Bahry Dakahlia	East Manzala	Boten
			El Mawaged
			El Shabol El Kadema
		West Manzala	Anbar
			El Gamalia
			El Tal
Ismailia	Ismailia	El Tal El Kaber	El Gnabia El Owla
			El Gnabia El Tania
			El Gnabia El Tania
		El- Tal El- Kaber	El Gnabia El Rabaa
			El Gnabia El Rabaa
			El Sandoq

**Middle Delta:**

Directorate	Inspectorate	District	Canal
Menoufia	South Menoufia	East Ashmon	Ramlat El Angab
			El Ameria
			El Neanaia El Bahria
		Menof	El Neanaia
			El Sangk El Ayser
			Manhr Ghmrin
West Dakahlia	Belkas	El Massara	El Sabaa
			El Bashma
			Bahr El Massra
		Hafer Shehab El Dien	El Neil
			Kom El Tebn
			Ammar

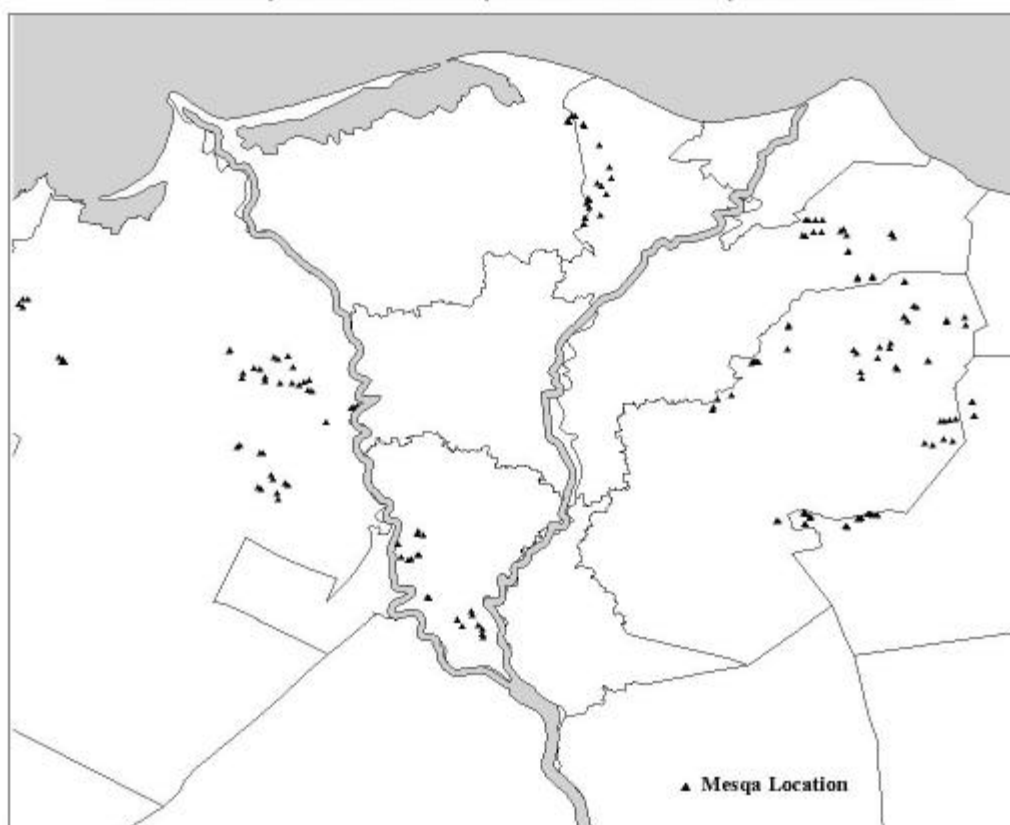
**West Delta:**

Directorate	Inspectorate	District	Canal
West Beheira	South Beheira	Kom Hamada	Abo Deyab El Aala
			El Afndia
			Zarafa
			Gwar Meania
			Safia
			Shabor
		El Tahdy	El Maaraka
			El Tal El Kaber
			Ain Galout
	El Amriah	El Nahdah	Hars 3
			Fara 1 Aiman
			Gnabiat Sednawy

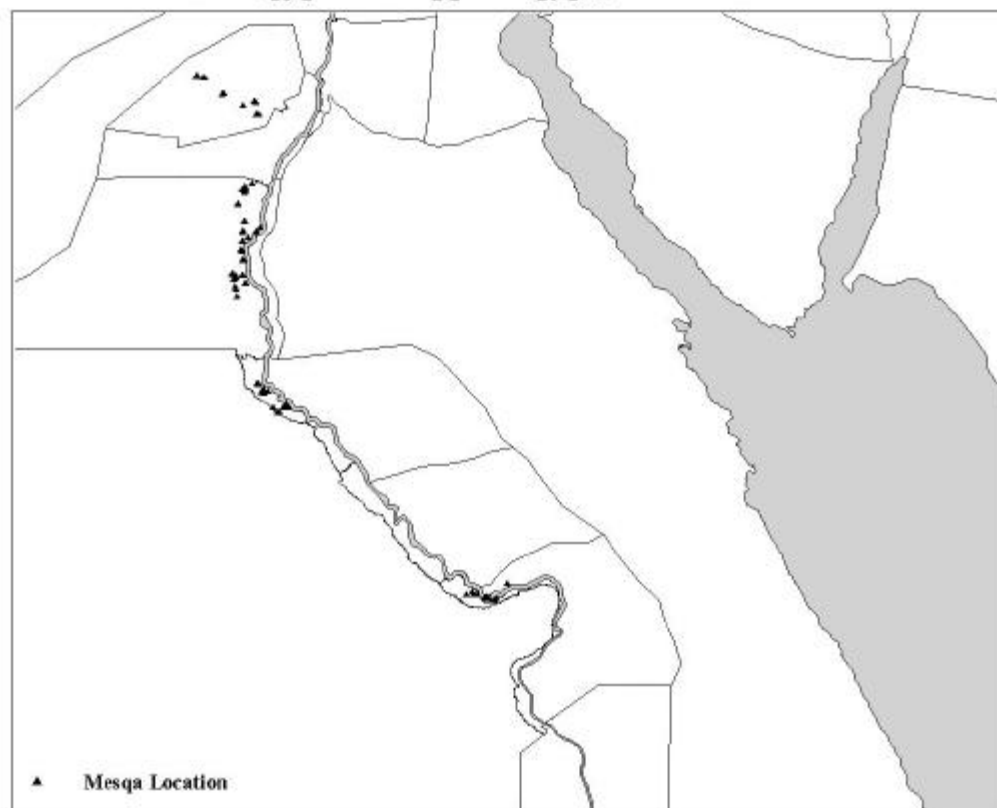
**Groundwater:**

Directorate	Inspectorate	District	Canal
<i>Groundwater</i>	El Farafra	El Louaa Soubaih & El Nahdah	~~~~~
	Matrouh	Sewa	~~~~~

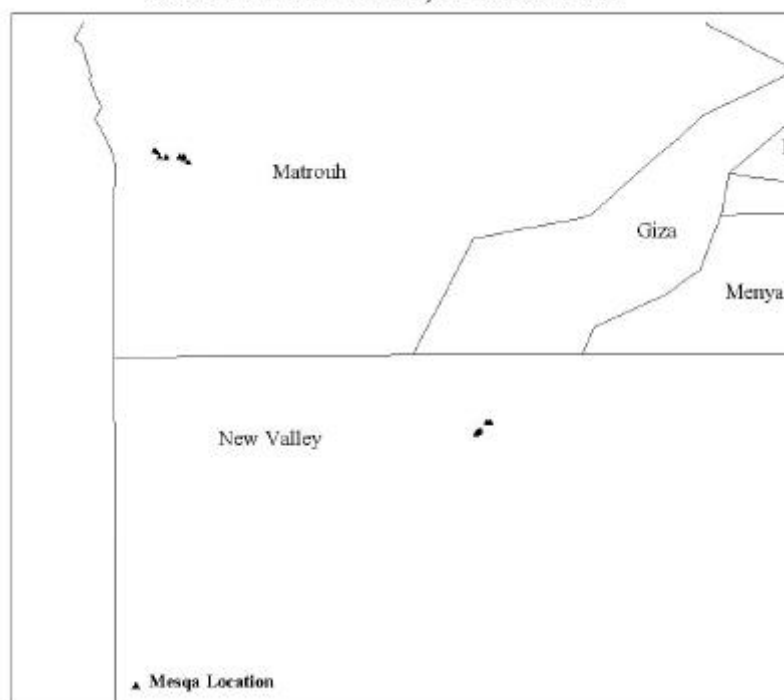
**Distribution of Sampling Points,  
West Delta, Middle Delta, and East Delta, Farmers 2001**



**Distribution of Sampling Points,  
Middle Egypt and Upper Egypt, Farmers 2001**



**Distribution of Sampling Points,  
Ground Water Areas, Farmers 2001**



## APPENDIX C – PRA INTERVIEW GUIDE

**Goal: Presenting the community population practices towards water use and management**

Main Topic	Sub-Topics	Methods Individual	Group	Diagrams
Living situation analysis	Sex - Age – Educational status – Marital status – Income sources – Landholding (own – rent) – Job – Region – Family size – Personal situational analysis.	Men and women		
Community background	Population size – Market and facilities – Community originations – Organizations (NGO – Governmental – Mosques – Commercial sector) – Places of community gathering (male – female) – Income sources – Land ownership.			Venn diagram
Distribution of roles in irrigation and agriculture	Preparing land (fertilizing – leveling – cultivating – irrigation – chemical fertilizer – ways of drainage – drinking water in dwellings – using water for animals – washing in canals).	Men and women	Men and women	
Management of water resources	Persons – Organizations that have a role in water management – Complaints procedures – Procedures of resolving conflict – Procedures of making decisions – Water users associations – Costs; determination; distribution and collection – Cleaning of private <i>mesqas</i> .	Men and women (focus group discussion)	Men and women	
Mass Media	TV – Radio – Fliers – Posters – Counsel - Needs – Hierarchy – Criteria.	Men and women	Men and women	
Analysis of water point	<u>Technical Data</u> Type of machine, Age of machine, Number of break down times in the year – Responsible for installation and maintenance. <u>Use</u> Number and type of <i>mesqa</i> users – Area of agricultural land on <i>mesqa</i> – How to collect money for <i>mesqa</i> . <u>Management</u> Management of resources – Staff of committees – Roles and special conditions of use – Other staff having a role.	Men and women	Men and women	



## **APPENDIX D – KAP QUESTIONNAIRES**

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**Arab Republic of Egypt  
Ministry of Water Resources and Irrigation**

### **Knowledge, Attitudes and Practices of Farmers Towards Water Resources Impact Survey 2001**

#### **Farmer's Questionnaire**

<p>Data collected from this survey are confidential and will be used in scientific researches only</p>
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## **APPENDIX E – PRA CASE STUDIES**

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